



Production strategies and pastoral man

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Pastoral man in Africa

One of the main differences between range livestock systems in countries such as America and Australia' and those in Africa, is that in Australia people derive a living from the range while in Africa people depend upon the range for life. In Australia if a grazier loses all his cattle he may go bankrupt, but in Africa if a pastoralist loses all his cattle he may also lose his life.

An African pastoralist may equally lose the capacity to support the life of his family by losing only a portion of the productive capacity of his livestock. Remembering what is at stake to the African pastoralist compared to the Australian grazier, is essential in understanding a pastoralist's reaction to the introduction of change and innovation

In Africa about 13-16 million km², or nearly half of the continent south of the Sahara, is desert or arid grassland and savanna where cultivation is a high risk enterprise (Brown, 1971). It is in these areas that almost all of the 20 million or so sub-Saharan pastoralists live, subsisting wholly or almost wholly on the products of their livestock (Helland, 1980).

Of all the secondary users of vegetation through animals, the pastoralist is the only one who depends on milk and not meat. All other secondary users including the advanced capitalist pastoralist or large-scale rancher depend on meat. No Australian rancher in his right mind in fact would attempt to produce milk commercially in the type of semi-arid area in which nomadic pastoralists live.

And yet the African pastoralist has relied on milk and still attempts to do so, except where that system is under pressure or breaking down as is occurring with the Afar of the northeast rangelands of Ethiopia. There is logic behind this reliance on milk for it has created a system independent to an extent of farmer neighbours with

whom the pastoral system may have been hostile at times, and which has the capacity to directly support, on a subsistence basis, far more people per unit area than any other arid area production mode. Jahnke (1982) estimates for example that if arid countries like Mauritania and Somalia organised their land use in the form of modern ranching, their pastoral population would have to be reduced by a factor of 50.

Measured in terms of survival, pastoral production systems in Africa have been remarkably effective (Dyson-Hudson, 1982). They have in general achieved their major objective of providing a reliable source of food for the population that actually operated the system, a supply that has been able to be sustained at life support levels throughout the dry stress periods in most years.

The number of people that any area is capable of supporting can be termed the 'human support capacity', and it is this factor that pastoralists seek to optimise. They do so through the production and consumption of milk. The objective is the optimisation of human numbers per unit area of arid land, while the strategy is milk production. This objective is the primary one for all pastoral systems, with the second and equally important objective being to provide as much security as possible for the dependent human population. This is achieved by employing a number of specific strategies. These days under the stimulus of development and change, there is also an increasing interest in productivity and wealth in terms other than livestock numbers.

General relationships between the natural productivity of the land and the human support capacity have been established by various workers for the agro-ecological zones of both East and West Africa. For example, for East Africa they are as follows (Pratt and Gwynne, 1977):

Agro-ecological zone		Human support capacity
Annual rainfall (mm)	Type	(ha/person)
	Very arid	1890
200		
300		
400	Arid	48.0
500		
600		
	Semi-arid	14.0

If the above criteria are applied to the semi-arid Borana area of the Ethiopian southern rangelands a figure of 17.2 ha/person results which indicates that the area has the capacity to support 21% more people than it presently does. The figure for the Afar who live in an arid to very arid area in the northeast rangelands of Ethiopia ranged from 11-50 ha/person which indicates that this pastoral system is under considerable pressure and has more people than it can reasonably support. Other data support these indications.

In all pastoral systems the consumption of milk or blood seems to be steadily dropping, and there are few (if any) which rely almost totally on milk or milk products. In some the reliance is still fairly high. The Borana of the southern rangelands of Ethiopia for example, with some seasonal variations, still consume up to 59% of their diet as milk or milk products with the balance of the diet being

increasingly made up of grain. For the Afar, milk now probably constitutes less than 20% of total energy requirements, and grain again is increasingly the main food substitute. This increase of grain and decrease of milk consumption is in fact more and more the pattern in pastoral Africa. Nevertheless the African pastoralist is still firmly oriented towards a milk production mode as far as circumstances will allow and has not yet dramatically changed this in favour of selling meat or growing crops.

In the 1960's, some ecologists (e.g. Brown, 1971) argued that the dependence on milk by pastoralists in arid areas was ecologically unsound, placing (as it does) the pastoralists in direct competition with their calves, and in creating a herd population structure where females make up 70% or more of the herd. In the inevitable cycle of good years and drought years this high breeding capacity led to rapid recovery after drought years and a very rapid increase in numbers which spiralled upwards, while environmental degradation increased with each drought period. In each drought, so the argument went, animals did their damage before they died, and as their numbers were great, so was the damage.

This is compelling theory in these times of environmental consciousness but it does tend to simplify the rather complex set of inter-relationships which exist between the pastoralist, his animals and the resources available to these animals in terms of grass or browse and water.

One of the functions of pastoral systems research is to observe and quantify entire pastoral production systems. Given this it is essential to consider pastoralists' objectives and the strategies they employ to attain these objectives. There are many misconceptions about the reasons why pastoralists do the things they do. Almost every study of pastoral systems over the last 30 years has shown however that pastoralists follow observable behaviour patterns which are rational with respect to their objectives, and that these patterns can be described. It is sometimes easier to record the effect (e.g. low weaning weight) first, and then determine the behaviour (e.g. offtake of milk for humans as well as calves), but the two, behaviour and effect, are linked and must be seen as a whole.

Pastoral man and production strategies

Almost everything a pastoralist does is the result of a deliberate decision, from his rain-chasing nomadism to the maximisation of females, which is an obvious strategy for a people one of whose main objectives is to maximise milk production. A similar case exists for breeding practices where the wider the distribution of the calf drop the more chance there may be of high mortality or poor calf growth for those calves dropped in the dry season, and the more likely there is to be a year-round supply of milk.

Nomadic pastoralism presupposes a high degree of organisational and spatial flexibility (Dahl and Hjort, 1979). Households constantly redistribute themselves over the terrain, and membership of households changes as labour is allocated and reallocated between different management units.

In any pastoral system a pastoralist has to construct production strategies to cope with three series of constraints. These are as follows :

1. Normal - the constraints placed upon the system by normal, mostly seasonal, events. A pastoralist's year normally ranges from times of plenty (the rains and post rains period) to times of shortage (the dry

seasons). The year is punctuated by a series of high and low periods where disease, parasite burdens, available forage come and go as problems.

2. Disasters - at times some of the normal constraints may assume disastrous proportions. The main disasters are epidemic disease, range fires in the dry season, and drought.

3. Long-term changes - these are often irreversible and consist of such events as the loss of dry-season grazing areas to cultivation, the relative advantages which may accrue to richer pastoralists because of government policies' or loss of revenues from caravans, raiding etc.

Not everything that a pastoralist does can be termed a strategy, and some actions can better be described as tactical decisions. In general, strategies are far less responsive to interventions than are tactical decisions which can be changed and adjusted fairly readily. In this paper I am using the term 'strategy' to denote the conduct of a campaign or the response to a set of circumstances in its long term and large scale aspects, while 'tactics' are taken to mean the use of resources to the best advantage and with respect to an immediate and short-term solution, generally at the production unit level.

In the pastoral context we can define a strategy as the consumption of milk, or the communal ownership of land, while a tactical decision may concern the movement of animals to specific areas at specific times, or a response to price differentials for different stock types. For example, it generally pays a pastoralist to retain a male animal in his herd until maturity. The reasons are simply economic. The labour expended in herding male stock is small compared to that required for cows and calves, which has to be done in any case, and the returns on keeping a male to maturity are usually worthwhile (Dahl and Hjort, 1979).

In Borana, for example, the average price of an immature male was Birr 198 compared to an average mature male price of Birr 313 (Negussie, 1983). The main labour bottleneck is at the wells in the dry season but there, with a livestock to labour ratio of 50:1, 10% more or less males do not make a great deal of difference. A change of relative immature/mature price ratios might bring about a change of tactics however. Steers are also preferentially retained to full maturity in systems which use blood as a milk substitute, as in the case in the Borana 'dry herds', and a replacement food may also have to be found before immature steers are readily sold.

Perhaps the most important strategy that pastoralists have evolved is the response to the threat of drought. Drought or very dry years are inescapable in most African pastoral systems. In the southern rangelands of Ethiopia, for example, the main rains fail one year in ten and the secondary rains one year in three in the Dolo area. Similar figures can be produced for any rangeland or pastoral system, and as there is no evidence to show that regular cycles of drought occur (Bille, 1983), a pastoralist has to be ready at any time for drought.

Knowing this, a pastoralist adopts several or all of a number of strategies, or traditional forms of insurance against loss. The most important of these (in East Africa) are as follows:

- maintain more than one species of livestock. Camels and goats are for example more resistant to drought than cattle and sheep.

- divide livestock holdings into spatially separate units to minimise the effects of localised drought. This requires a high labour input or more than one household.
- establish and maintain social systems for resource sharing, or for borrowing, lending and gifting.
- maintain large herds, or as large as possible, to maximise the chances of having some left when the drought is over.
- during the drought or disaster minimise the reliant human population by sending away all able-bodied people not required to work the system. People have been most often sent to adjacent agricultural areas (e.g. the Maasai to the Kikuyu areas in the smallpox/rinderpest epidemics of the 1890's), and contrary again to previous opinion, contacts between farmers and pastoralists in East Africa seem to be long established (Hjort, 1981).

Again these are reasonable strategies given the limitations of the system and the fact that there has never been access to or any reason to trust a formal banking system to build up reserves against bad times, or an insurance policy which will sustain a pastoralist through drought.

Drought effects do not always relate directly to rainfall (Dahl, 1979). The same amount of rain may produce very different subsistence conditions depending not only on the availability of dry season pasture, but also on the number of people needed to make the necessary movements, or raise water, and on the amount of milk, meat or blood needed to feed them, or the amount of grain available for purchase.

Drought effects are thus not solely an ecological phenomenon, and socio-political aspects or market supplies are secondary but important functions. The Afar, for example, are still responding to the great Wollo drought of 1972-74 by switching from cattle to selling smallstock. Our market figures show however that they bring to market twice as many smallstock as the various markets can absorb, and this inability to sell certainly affects the viability of the system. The Afar response also reflects the fact that mortality rates are markedly differentiated by age during a drought (Dahl, 1979). Among the Afar Arapta clan during the beginning of the Wollo drought of 1972-74 (Cossins, 1972) there were marked age group gaps in the cattle herd particularly for older cows and heifers. When these gaps were superimposed on the herd composition figures the graph shown in Fig. 1 resulted.

[Fig. 1. Projection of future native milking age cow numbers for the Arapta clan.](#)

Dahl (1979) found for the Isiolo Boran that there were particular years after a drought that were bad from a reproductive point of view. Fig. 1 shows that while there was likely to be a marked recovery within five years, the worst was still to come for the Arapta clan. Experience in the Afar system has vindicated this prediction, and the Afar are still largely dependent on selling small-stock for their subsistence. Provided another drought does not occur, the Afar could be expected to move back into an increased reliance on cattle from 1983 onwards.

There is a contradiction here, for smallstock are more efficient at converting pasture into consumable meat and milk, and are more easily marketed, so why

should the Afar attempt to move back into cattle? There are probably two main reasons. While goats in particular are more resistant to drought and the recovery rate of smallstock is rapid, smallstock are much more susceptible to disease than cattle, and an epizootic can claim high death tolls.

Secondly, the present market system is not able to buy all the smallstock that the Afar need or want to sell at reasonable prices, nor does it provide all the grain the Afar need to buy for subsistence. Unless this is changed, it is a logical production strategy for the Afar to move back, as far as is feasible into milk production from cattle, even though this may not be an ecologically or economically sensible strategy,

Probably the most emotive and contentious issue concerning pastoralists is the numbers game. Range managers and ecologists continually promote the need to destock African rangelands. The pastoralists resist. Why they resist is the root cause of the problem and one that tends to be overlooked. Brown (1971) was among the first to identify the problem as being one of human numbers rather than livestock numbers, and it is important to recognise this distinction for it answers the question of what can be done about this problem and why pastoralists will not destock. It has nothing to do with the 'tragedy of the commons' argument (Harbin, 1968), and has everything to do with common sense.

Let us look at the Borana for example, The Borana live in a 600 mm rainfall rangelands areas, are Still oriented to the pastoral mode of production, and seem to be relatively well-off as a people, in that hunger does not feature highly on their list of problems. We know that the average family consists of about 3.5 adult equivalents (it is actually slightly less than this from our household studies) and we can estimate that their total energy requirement per day will be about 33.7 KJ.

We know such a family owns or has access to about 18 head of cattle which, using the herd structures derived from the well studies, means about six lactating cows at any one time. We know also that the average offtake per cow for human consumption over an average ten-to eleven-in month lactation period is 312 litres or 2050 litres per year. In terms of energy this is equivalent to about 7175 KJ.

Our market and household data show that the unit family also sells two mature animals a year, and consumes slightly less than one cull female or an animal about to die (fallen meat), They also keep six sheep and seven goats and the production from these is also sold or consumed. The data also indicates that they consume about 150 kg of smallstock and fallen meat per year, and that part of the income from all livestock sales is used to buy grain, coffee, sugar etc., and that there is also a supplement of bush foods and blood for the boys herding the dry herds From these sources a total of about 6982 KJ of energy is potentially available 6075 KJ, if no meat is consumed).

Putting the milk, meat? grain, coffee, sugar etc., together gives a total available energy intake of about 14,157 KJ of which milk constitutes about 51% Based on the combination of adult equivalents and estimated daily energy requirement, the average Borana family requires 12,132 KJ per year. The difference between these two figures suggests that we have either over-estimated the contribution to the diet of other food, particularly meat and grain, or the Borana eat well occasionally, Whatever the ease, the above exercise shows that the Borana generally have enough to eat, although there may be seasonal shortages, with about 200-300 Birr per year left over for clothes, tobacco, talla etc.; but the margins are not great, and even one cow would be missed.

[Fig. 2. Family resource diagram for the Borana livestock system.](#)

The above information is interesting in its own right, but what we can also conclude from it is that there is no way that the 'average Borana family' can destock without substantially reducing its standard of living? (e.g. no tobacco or talla or clothes etc.), and that stock reductions of over 15% would put that family on the subsistence borderline. Now the Borana are amongst the more fortunate of East Africa's pastoralists, so that it is quite clear that the pastoralists' resistance to destocking is based on a strategy of survival, no matter how foolish it looks to the conservationist. Jahnke (1982) describes the difference between the human support capacity of African pastoral areas and the actual numbers as about 1:2, or 12 million versus an actual figure of some 20-29 million people.

What is required to precede any destocking policy is not an educational campaign which shows the pastoralist the damage his animals may be doing to the range, but a change of pastoral mode. If the 'average Borana family' as described in the above example were to convert to a mainly grain/bean diet with some milk, and were to maximise sales from all livestock, then that family's net income from the same number of animals would at least double. Conversely, the number of livestock could be reduced by half and the same standard of living maintained.

This applies to most pastoral systems. Jahnke (1982) suggests that the prevailing terms of trade for African pastoral systems in general are 1,7 kg of grain for 1 kg of milk, and 4 kg of grain for 1 kg of meat, so that a pastoralist significantly improves his subsistence basis by trading. Many examples of this can be found in West Africa among the Fulani who trade milk particularly for grain, while in East Africa the volume of this trade is rapidly increasing.

Encampment food grain plots also provide an alternative. A plot which yielded only 4 quintals per year would provide more than 30% of yearly food requirements for that same Borana family, would allow at least a 15% reduction in the average herd size (from 18 to 15 cattle), or would allow an increase in the offtake rate of at least 6% (an increase to 18%) or add an additional 20,000 cattle to the 40,000 presently sold out of the system.

All these figures are very tantalising to the planner and developer, but there are substantial problems of pastoralists' confidence and conservatism to overcome, just as there are for any farmer anywhere when you want him to make a very considerable change in his mode of production. There is also an equally large problem of providing an assured and regular grain supply in a continent where grain deficits prevail, and to provide an assured and regular market outlet for livestock at acceptable prices.

My argument however, is not really about these aspects, but merely uses the above to point out that overstocking is a problem of human numbers, and that the pastoralist knows this and so resists any pressures to destock unless alternative means of supporting his family are available. And he has to have confidence in such alternatives.

The communal use of land is another pastoral strategy, and it makes sense considering the variability and unreliability of rainfall in African rangelands areas. In any one year rainfall may vary within a pastoral system by as much as 200% from the mean, as it may between years. As there also appears to be no cyclical effect involved (Bille, 1983) so that a planned rotational system is not feasible, it pays a

pastoralist to have access to as large an area as possible. Individual or group ownership of specific areas of land precludes this strategy, and just so long as a pastoralist continues to have his life at risk rather than his livelihood, and maintains his bankable reserves as livestock, subdivision of land will be counter to the ability of a pastoralist to survive.

Perhaps the last example to consider is that of organisation and cooperation. Pastoral systems generally require a high degree of both if they are to function well. Where neither occurs, and small units compete for resources instead of cooperating in their use, the system begins to break down as is probably happening in the Afar system.

In the Borana system, organisation and cooperation is still high and the system works well. Imagine for example, the degree of organisation and cooperation that is required to work, say, the wells at Bor Bor. There, in 1982 over three days, some 47,000 head of cattle, 22,000 sheep and goats, and 2,000 other stock were watered in groups of 50 to 100 at nearly 300 groups per day, in the same or nearly the same sequence every third day, and some 780 people were organised to work in one of 17 wells also every third day. This was no mean feat under any circumstances. Thus a society which stresses community over the individual, and which stresses common but organised rights to resources, is more likely to succeed in a pastoral context than one which stresses individual rights.

Production strategies and decisions affect almost every part of any pastoral system. The decisions and strategy alternatives facing a pastoralist are no less complex than those facing a western rancher, and because he may have less control over his resources, and the use of these resources involves far more human labour, the organisation and decisions required of a pastoralist may be even more complex.

The idea of the pastoralist as a simple fellow pursuing a simple mode of life is thus a false one. Outwardly, a milk-drinking, cattle-owning pastoralist may appear so, but his system is highly complex and the strategies he has devised to cope with it are equally complex. Unless an intervention is aimed at the cause of the strategy it may not succeed or be adopted, except where the intervention affects a tactical decision rather than a strategy. It is important to understand this when designing a research programme or deciding on research priorities.

Determining management strategies

In the above I have discussed pastoral management strategies and tactical decisions. In the past, pastoral management strategies were relatively uniform with respect to a particular climatic zone, and centred on a mobile human population, dispersed in small groups at low overall densities, with an introverted milk-oriented subsistence.

This population experienced major fluctuations in numbers over time, because of the unreliable distribution of rainfall over time and space (Dyson-Hudson, 1982). Livestock numbers were also often limited by the uneven distribution of water resources with respect to grass and browse.

In general, multi-species herding was the norm as a response to the probability of drought and to fully exploit the often mixed grassland-shrubland-woodland of the environment (Dyson-Hudson, 1982). Modifications of the environment or essential resources included the use of fire to control bush, stimulate the regrowth of grass, or to control ticks, and the development of sometimes quite complex wells and

ponds. The major strategies however, concerned the dispersal of small production groups over large commonly held areas, and a livestock composite design which included a mix of species and a structure where females predominated. This structure was remarkably uniform for all species and even included horses in Borana.

Pastoral systems are under pressure. Their populations are no longer allowed to adjust naturally to phenomena such as drought or to expand in a traditional territorial sense through force. They are increasingly being brought into the mainstream of development by forces beyond their control, and into situations where traditional pastoral strategies may become less efficient. These strategies then become less useful to pursue, as Dyson-Hudson (1982) writes, and pastoralism then becomes less likely to persist as a plausible pastoral mode of land use.

The strategies pursued by pastoralists are thus changing as pastoral populations respond increasingly to development inputs, political and administrative pressures, and to changing aspirations. The main question to answer for any pastoral system and, by extension, the importance of this question to any pastoral systems research programme, is what strategies are being pursued by the pastoralists under study, and why, and how does one differentiate production strategies from tactical decisions.

Seasonal movements reflect both strategy and tactics. Access to as large a piece of communal land as possible in order to exploit rainfall whenever and wherever it occurs is the strategy, but the tactical decision is the determination of where and when to move for a specific herd or herd group at a specific time. Given the correct intervention, e.g. improved pastures in a specific area, it is relatively easy to induce a change in the tactical decision. It is not so easy to bring about a change in the strategy which is based on the unreliability of rainfall in the arid areas, and the maximisation of opportunity.

If a change from the traditional norm has occurred, it will tell us a great deal about the system and its possible future. The Maasai for example are beginning to countenance individual ranch holdings, which probably signals the beginning of the end for Maasai as traditional pastoralists. The Borana on the other hand still strictly observe the strategy of communal rights to all land in their production sphere, and are still well within the traditional pastoral orbit.

Mode of production is also a strategy and can be determined for example from herd structures. Borana herds consist of 74% females which almost certainly means that the Borana follow a milk production/consumption mode. However the herds also contain about 6% castrated male animals which indicates that animal sales are a secondary strategy.

Pastoralists' drought response strategies can be determined in a variety of ways. Species mix is one indication, and the extent of this is also an indication of the frequency and severity of drought in any area. In the southern rangelands, an area with a relatively good and reliable rainfall (600 mm), the cattle/smallstock/camel ratio is about 3.6/1.3/1, whereas in the much more arid northeast rangelands area, the species ratio is 4.3/11.25/1. Both systems have a species mix, but the Afar's reliance on smallstock indicates a greater and more frequent drought risk.

In general terms the phenomena surrounding a tactical decision respond readily to research inputs, whereas the response to research relating to production strategies is another question. While it is theoretically possible to change the whole production

strategy of pastoral reliance on milk for example, and so in the Borana ease convert a self-sufficient medium animal offtake (10-12%) system into a self-sufficient higher offtake system (18-20%), this would require considerable organisation and inputs on a supra-system scale, and would also require a national net grain surplus.

Some general rules of thumb regarding pastoralists and the strategies they have evolved to cope with their environment are as follows. If the main -national objective remains to use arid areas to support the maximum number of people (maximum human support capacity), then the subdivision of land into discreet units to be owned either by individuals or groups will inevitably reduce the long-term human support capacity of the area; social systems are best left to evolve and look after themselves; removal of land at the fringes of pastoral systems reduces the capacity of the system to survive, as this is usually land whose value to the system far outweighs its physical size (dry-season grazing or strategic area grazing retreats); and it is worth rethinking the ideas of the past which have tended to emphasise the superiority as a production mode of various modified forms of ranching. Ranching cannot compete with pastoralism in terms of human support capacity, and pastoralists can often produce meat nearly as well as any ranch, and much cheaper in the context of the system they already operate.

This paper has addressed strategies and tactical decisions in terms of overall pastoral systems, but the individual producer unit also operates a number of alternative strategies and is responsible for almost all the tactical decisions that have to be made.

Dyson-Hudson (1982) has described East African pastoral systems in terms of a two-tiered structure. The first tier is the division of a region's natural resources into a small number of large units and the second tier being a large number of small units which control and manage the livestock resource in terms of defined herds and flocks. The size of the first tier of units is posed as being sufficient to accommodate most normal variations in seasonal rainfall' and also to mitigate the effects of all but the most severe disasters.

The second tier of many thousand of small producer units is essentially autonomous in terms of management decisions, and although there is cooperation between these units, this does not, and in fact cannot, extend to guarantees of survival. These small groups may be linked, or controlled and governed to an extent through other bodies which have been evolved as a mechanism to arrange security on a system scale, solve disputes between units, distribute information, and allocate resources. Such bodies may be based on kinship, locality, age sets or other related aspects, but the basic structure remains the two interdependent units which 'put humans into association with livestock and with natural resources' (Dyson-Hudson, 1982).

Strategies and decisions are influenced by a variety of factors at the producer unit level, and it is important to understand what these factors are in terms of identifying constraints, and why there are differences not only between systems and between seasons, but also within a system between producers. For example we have found in Mali marked differences in productivity between herds which can only be attributed to management (Wilson, 1982), and in Kenya we have found that richer Maasai pastoralists have different responses to phenomena and management alternatives than do poor people (Grandin, 1982). The richer pastoralists also have a greater ability to respond to opportunity, and in fact every parameter studied to date in the Kenya programme has had a wealth rank strata.

The strategies and decisions which fall within the realm of the individual producer deserve at least as much attention as those of the pastoral system as a whole, and these are the subject of the following papers.

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Les stratégies de production et l'éleveur

Résumé

Parmi tous les utilisateurs secondaires de la végétation, l'éleveur est le seul dont la subsistance est assurée par le lait plutôt que par la viande. Le nombre de personnes qu'une zone peut accueillir peut être appelé la "capacité de charge humaine" et c'est ce facteur que les éleveurs cherchent à optimiser. Ils le font par le biais de la production et de la consommation de lait. L'objectif est l'optimisation de la population humaine par unité de surface de zone aride et la stratégie utilisée est

la production laitière.

L'une des fonctions de la recherche sur les systèmes pastoraux consiste à observer et à quantifier les systèmes de production pastorale. Il devient donc vital d'examiner les objectifs des éleveurs et les stratégies qu'ils emploient pour atteindre ces objectifs. Dans tout système pastoral, l'éleveur doit mettre au point des stratégies de production pour faire face à trois séries de contraintes:

- les contraintes normales. Il s'agit des contraintes qui pèsent sur le système du fait d'événements normaux, saisonniers la plupart du temps;
- les catastrophes. Quelquefois, certaines des contraintes normales peuvent revêtir des proportions catastrophiques. Les principales catastrophes sont les épidémies, les feux de brousse en saison sèche et la sécheresse;
- les évolutions à long terme. Celles-ci sont souvent irréversibles et se caractérisent par des événements tels que perte de pâturage de saison sèche du fait de l'empiétement de l'agriculture ou perte de revenus du fait de pillage par les caravaniers, etc..

Dans le contexte pastoral, nous pouvons définir la consommation de lait ou la propriété collective de terres comme étant une stratégie alors que les mouvements des animaux dans des zones spécifiques à des moments spécifiques ou en réponse à des variations de prix pour différents types de bétail peuvent constituer des décisions tactiques. Signalons à cet égard qu'il est possible que la stratégie la plus importante parmi toutes celles que les éleveurs ont mises au point soit la réponse à la menace de sécheresse. La sécheresse est inévitable dans la plupart des systèmes pastoraux africains. Fort de cette connaissance, l'éleveur adopte tout ou partie d'un ensemble de stratégies ou de formes traditionnelles de prévention contre les pertes telles que :

- l'élevage de plusieurs espèces de bétail;
- la division du troupeau en unités spatialement distinctes pour minimiser les effets des sécheresses localisées;
- la mise en place et le maintien de systèmes sociaux de partage des ressources, d'emprunt, de prêts et de dons;
- l'élevage de grands troupeaux pour maximiser les possibilités de survie des individus après la sécheresse;
- la minimisation des risques pour la population humaine au cours de la sécheresse ou pendant la catastrophe en organisant l'exode de tous les bras valides dont la présence dans le système n'est pas indispensable.

Les systèmes pastoraux sont soumis à de fortes pressions. Leurs populations n'ont plus la possibilité de s'adapter à des phénomènes naturels tels que la sécheresse ou d'assurer l'expansion de leur territoire par la force. Elles participent de plus en plus au processus général du développement du fait de l'action de forces qui échappent à leur contrôle et sont plongées dans des situations où les stratégies traditionnelles d'élevage peuvent devenir moins efficaces. Ces stratégies deviennent alors moins utiles à poursuivre et la survie du pastoralisme conçu en

tant que mode praticable d'utilisation des terres devient hypothétique. Les stratégies adoptées par les éleveurs changent donc à mesure que s'accroît la sensibilité des populations pastorales aux facteurs de développement, aux pressions politiques et administratives et à de nouvelles aspirations.

Les stratégies et les décisions sont influencées par une variété de facteurs au niveau de l'unité de production et il est important de comprendre ces facteurs en vue de l'identification des contraintes au système ainsi que les différences non seulement entre les systèmes et entre les saisons mais également, au sein d'un système, entre les producteurs. Les stratégies et les décisions adoptées à l'échelon du producteur individuel méritent au moins autant d'intérêt que celles de l'ensemble du système pastoral.

