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**ISSUES PAPER**

# Where herders don't herd anymore: Experience from the Ferlo, northern Senegal

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"Ngaynaaka majji" - Where herders don't herd anymore: Experience from the Ferlo, northern Senegal

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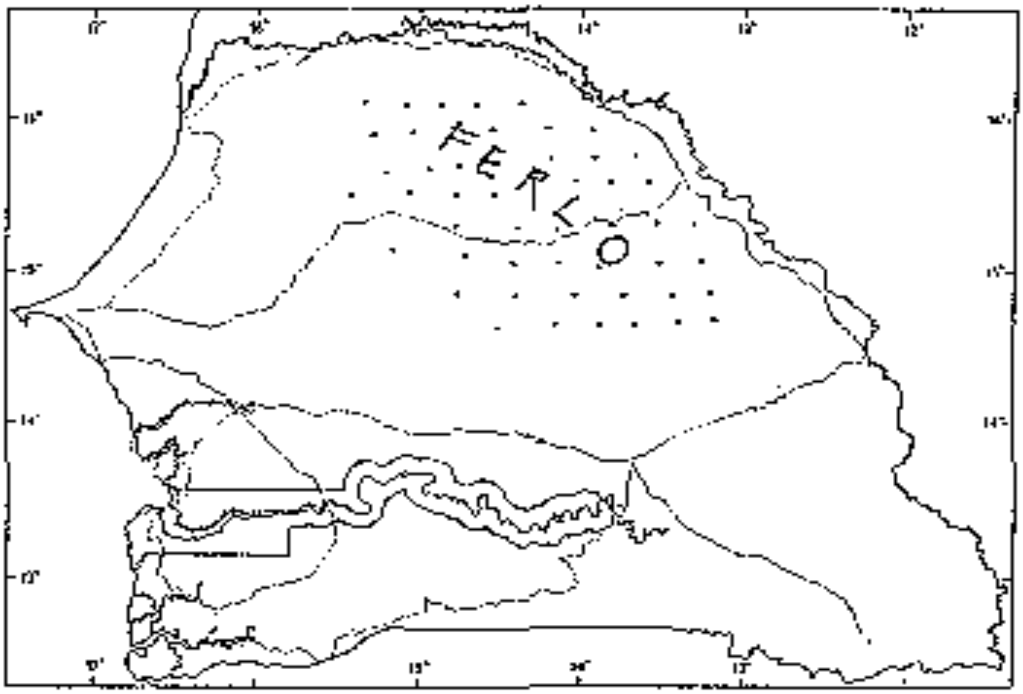
Summary

Past research undertaken in the Ferlo region of Senegal has concluded that pastoral practices have "deteriorated" and that there is widespread over-stocking. Both factors together are seen as responsible for environmental degradation. As a result, policies have been established to control livestock populations and set up pastoral associations to organise land-use and manage communal natural resources. However, changes in husbandry practices leading to widespread abandonment of cattle-herd surveillance means that attempts to improve rangeland management may be doomed to failure.




Map: Senegal and the Ferlo Region

## 1. Introduction

Over the past few decades, far-reaching changes have affected the extensive herding systems and practices in the Ferlo region of Senegal (see map). Various researchers (Barral, 1982; Dupire, 1957; Grenier, 1956; Santoir, 1983) have mentioned the progressive decline of the great seasonal transhumance patterns. Formerly moving over vast areas of rangeland, pastoralists have now taken up new forms of mobility, described by Barral (1982) as "short-range nomadism" within the grazing areas around boreholes. The surveys we have conducted recently (between 1986 and 1989) confirm these trends.

Another aspect of the current changes is the move away from systems of controlled herding requiring permanent human supervision of livestock and the use of auxiliaries to drive the herds such as sheep dogs. As Pouillon (1984) says, the pastoralists have "virtually dispensed with guarding their herds now that a safer environment and the shorter and more regular rhythm of stock movements mean that their active intervention is no longer required". Livestock, which used to roam freely only during the post-harvest period, now do so all year round.

Along with the abandonment of cattle-herding and surveillance systems, a whole set of traditional pastoral techniques and practices are falling into disuse. The pastoralists are quite well aware of this and themselves point to the younger generations' lack of the necessary knowledge and know-how to carry out correctly these operations (caring for the animals, feeding, herd selection etc) which ensure the upkeep of the animals and enable them to produce and reproduce.

Referring to the way things have been developing, one of our informants declared that husbandry practices were now being forgotten ("ngaynaaka majji"). This situation is generally considered to be the result of a lack of enthusiasm for herding as an activity amongst the younger generation. Could this lack of interest be the main reason for the changes taking place? What is the logic behind current methods of rangeland management and use? What are the likely economic and environmental consequences of such strategies?

In order to answer these questions, we conducted a survey into herding practices for the various animals. In order to take account of the diverse ways in which the environment is exploited we chose a sample of 89 herding units which included those around fourteen boreholes and represented the range of situations encountered in the Ferlo region.

## 2. Factors producing changes in herding practices

To our knowledge, apart from Barral's (1982) survey of ancient and modern rangeland management in the Ferlo region, no other research has undertaken a systematic study of rangeland use patterns in the Sahelian area of Senegal. Barral showed that the former system of extensive seasonal transhumance covering long distances (from the "jeeri" to the "waalo" in the north or the "jolof" in the south) has been replaced by "short-range nomadism". This means movements which "generally resemble pulsatory movements (around the boreholes) from the rainy season grazing areas to the dry season grazing areas and vice versa, the former being usually, but not always, the furthest from the boreholes".

According to Barral (ibid), this development leads to problems inasmuch as "current rangeland management is more a function of logistical convenience (the closeness of permanent encampments - wet season pasture and dry season encampments - dry season pasture) than of environmental concerns".

This being the case, the pastoralists have achieved a remarkable degree of adaptation to a landscape radically altered by the boreholes, inventing a new form of mobility which Barral calls "micro-nomadism". The author stresses that this pastoral strategy is perfectly coherent given that "it allows full advantage to be taken of the most distant grazing areas within the catchment area of the various boreholes".

Another phenomenon highlighted by the survey is the disappearance of former systems of regulation and social control of the rangelands in favour of a new pattern structured by the boreholes. According to the author, this abandonment of the old system of collective control and responsibility for the land amongst pastoralists should not be interpreted as a sign of a disintegrating social fabric. "Beyond what might look like a striving for individualism and rejection of traditional discipline," Barral (1982) believes that "a new solidarity born of dependence on the same borehole is beginning to emerge".[1]

By analysing the development of herding practices, the author is seeking to trace the origins of the afore-mentioned changes back to the opening up of pastoral systems to the outside world, which has resulted in a weakening of endogenous regulations in the political (declining authority of heads of lineage and customary chiefs), social (fragmentation of the population and slackening of the ties of solidarity within groups) and legal (calling into question of customary land rights by the public authorities) spheres.

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1 This solidarity "is forged by the need to pay dues for the purchase of diesel to run the pump (at the borehole) and, if the latter breaks down, to pay for a "bush-taxi" to take a representative of the borehole users to Louga to seek the help of a repair team, etc". (Barral 1982)

Without overlooking the internal dynamics of local societies, it must indeed be acknowledged that the disruption of the traditional socio-spatial organisation has been largely the result of the opening up of pastoral systems and the imposition of external rules. The loss of political autonomy in Peuhl societies following the colonial conquest was accompanied by the emergence of new forms of rural land management whose aim was to induce pastoralists to settle. A whole series of practical measures were designed to make the process of sedentarisation of groups and herding systems irreversible.

In this way, the different activities undertaken (bringing in political security, opening up of boreholes with mechanical water-drawing systems, destruction of major predators, etc) radically altered the parameters and enabled a formerly seasonal population to settle permanently in the Ferlo region.

As an uninterrupted water supply is available throughout the dry season (unless the pump breaks down) the pastoralists are no longer obliged to fall back on the wells in the areas south of the "Kooya" or to return to the Senegal river valley when the temporary pools and "cëanes" dry up. As Santoir (1983) observes, the primary advantage of boreholes for the Peuhl is "the ready supply of drinking water, which saves time and effort".

It should be stressed that the elimination of the difficulties of finding water is not the only attraction of hydraulic infrastructure. Criss-crossing the region with a network of permanent water points has also made it possible to exploit vast areas of rangeland which were formerly deserted in the dry season because of the lack of water resources. Thanks to the boreholes, the availability of water is accompanied by an extension in rangeland, ie by an increase in fodder resources actually accessible to livestock.

The settlement of groups around the boreholes has acted in synergy with other factors (reduction in areas previously subject to access regulations in the south, due to encroachment by agriculture; shrinking of grazing land and decrease in pastoral potential in the "waalo" as a result of hydro-agricultural improvements), thus contributing towards an appreciable reduction in pastoral mobility. This development was reinforced as of 1960 by a series of legislative and regulatory measures which tended to restrict livestock movements. In fact, the adoption in 1962 of various decrees relating to health supervision of animals hampered livestock movements by making them subject to strict controls and the obtention of "health certificates" and other "passes" (Ba, 1982).

The changes which have reduced herders' movements (ie abandonment of the major dry-season transhumance in favour of circumscribed movements within the boreholes' catchment areas) have obviously had an influence on herding practices: 'As we have seen, most pastoralists have abandoned the practice of watching over cattle herds, which they consider superfluous now that "the bush is no longer dangerous and the animals know the area well, especially the pasture they usually go to".

The elimination of the most arduous tasks (finding water and drawing it by hand, watching over cattle herds, protection against predators etc) is increasingly leading to a lower input of labour in the upkeep of livestock. In view of current pastoral production conditions, there is more time available. This free time is generally devoted to social exchanges and other activities such as livestock trading.

Although the favourable development of the environment may allow this decreased labour input, the latter must also be set against the widespread destabilisation of traditional production structures which has, amongst other things, led to the splitting up of family production units and rural exodus.

Such changes clearly have an effect on the operation of herding systems and, more particularly, on the way in which certain major technical operations are carried out (herding, surveillance, control over reproduction and medical care)Family units with a considerable number of livestock are generally faced with problems of labour shortage or lack of interest amongst young people for an activity which they see as demeaning.

## 3. Environmental problems: context and extent

The generally held view is that reducing livestock surveillance to a minimum represents a deterioration in husbandry practices which is damaging the environment. According to Santoir (1983), "pastoral traditions are increasingly being lost" and "despite an unexpected capacity for resistance, the pastoral environment is becoming degraded; it is being exploited to the hilt".

In order to understand these phenomena, they must be considered within the context of profound changes in the relationship between local societies and their environment. In this respect, the author observes that the "Peuhl's assessment of his environment is becoming more and more 'indulgent' and tending to push back the limits of what is tolerable for his herds" (Santoir, ibid). In other words, pastoralists no longer see the environment as precious capital whose preservation and regeneration are everybody's concern. They do not worry about the state of the ecosystem until the process of deterioration is already under way.

The research by Deramon et al (1984), aiming to evaluate cattle herding systems in the Ferlo region, stresses the climatic changes which have taken place in the recent past. In these authors' opinion, the sahelian region in undergoing "a long-term drying-out process (an average decrease in rainfall of 100 mm over the last ten years compared with the norms of the preceding period); a drying-out which is in danger of provoking irreversible damage to vegetation, even if it is only transitory".

They consider that the effects of this environmental crisis are aggravated by anthropic factors, in particular the continual increase in "herd size which often exceeds, sometimes quite substantially, the maximum norms permissable". It is therefore

essential to bring overall herd size and available fodder into balance if one wishes to avoid over-grazing leading to environmental degradation and "giving rise to much more brutal means of control (of herd size) during the periodic droughts".

Our survey of changes in Peuhl societies in the Ferlo region (Touré, 1987) basically considered the same problem of finding a balance between numbers of livestock and available fodder, highlighting the existence of a fundamental contradiction between the finite nature of space available and the strategy of extensive exploitation of natural resources by an ever-increasing number of animals. Our findings about the changes in progress were based on the assumption that available natural resources were decreasing and that strategies for occupying and using land had to be modified.

It seemed to us that extensive pastoral systems were perfectly feasible so long as there were abundant natural resources which were sufficiently difficult of access as to limit their use. The considerable increase in the numbers of livestock permanently present in the region and the changes which have taken place with regard to agriculture (extension of the groundnut-growing area to the southern edge of the Ferlo region and construction of hydro-agricultural improvements in the Senegal river valley) have now cast doubt on the hypothesis of abundant resources.

Furthermore, the absence of any form of social control over land-use or of user responsibility in herding systems has led to anarchic exploitation of the collective environmental wealth. Such a strategy runs the risk of bringing about, sooner or later, serious environmental degradation which could jeopardize the very foundations of the Peuhl economy and social system. For all these reasons, it seemed to us that the Ferlo region's extensive pastoral systems had reached the limits of their internal logic and could not avoid radical changes implying a reduction in overall livestock numbers and an intensification of production techniques.

It should be pointed out that these findings were based more on theoretical considerations than field data. In fact, they rely on the theory developed by Hardin (1968) which he called "The tragedy of the commons", according to which free access to resources and an increase in the number of users are bound to lead to over-exploitation. At an individual level, the user perceives direct costs less and less and, at the same time, nothing encourages him to adopt long-term conservation strategies because he has no guarantee that he will be able to enjoy the fruits of his efforts to maintain or improve natural resources.

## 4. The results of monitoring pastoral ecosystems

The CSE's monitoring of the main environmental parameters since 1981 calls into question the conclusions reached by the above research with regard to the environment. Without going beyond the parameters established by previous studies, the CSE has come up with findings which do not confirm the hypothesis that widespread overstocking is the main factor degrading the local ecosystems. In fact, contrary to the picture of rangeland reaching saturation point, the establishment of an animal pressure index on the basis of the ratio between animal numbers as estimated through aerial surveys and available fodder shows that "in years of average rainfall, the pastoral zone seems to be generally under-grazed" (Prévost, 1989).

There is thus no concrete proof to back the affirmation that the degradation of rangelands is largely due to the disruption of the balance between livestock numbers and available resources.[2] Such statements seem to us to reflect the subjective reactions of observers confronted with the spectacle of desolation all over the Ferlo region during the years of drought. Beyond the images which so much impressed the general public (denuded landscapes, carcasses of cattle littering the cracked earth, exodus of starving people) it was the trend towards a sharp decrease in the production of herbaceous biomass that made some researchers fear that the future of the rangelands was under threat.

The sparseness or even absence of plant production between 1981 and 1984 were interpreted as a measure of the rangeland degradation, whereas in fact this appreciable drop in herbaceous biomass was largely due to insufficient rainfall and was thus a transient phenomenon. This is borne out by the fact that the return of the rains as of the 1985 season produced a remarkable resurgence of plant production (CSE, 1988; Diouf et al, 1989).

It should be noted that biomass produced over the last three years seems to have been sufficient overall to meet the needs of livestock, except in the near "jeeri" strip where production remained relatively low (between 500 and 1000 kg dry matter per hectare on average for the years 1987 to 1989). However, due to variations in the intensity of grazing, some areas quickly exhausted their fodder reserves, while others still had a considerable amount of uncut dry matter available at the end of the dry season.

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[2] According to Santoir (1983), the increases in livestock numbers have led to "crowding of pastoral land amounting to actual congestion". He adds that "this congestion causes widespread over-grazing with effects which are soon felt". We have seen that this viewpoint is not borne out by the findings of the CSE's monitoring. However, the Centre's conclusions about stocking levels need to be discussed with reference to the specific situation of each area and seasonal patterns of rangeland use.

This imbalance is to a large extend due to the fact that the richest pastures are the first to be grazed. It should be underlined here that it is precisely the desire to get to the richest pastures before anyone else which is responsible for the extreme mobility of the nomad families ('egge egge') living to the south and east of the 'kooya' region. Other factors come into play in rangeland use, in particular its accessibility which is dependent on the existence of water resources and on its distance from a borehole. Owing to frequent and often prolonged pump breakdowns, vast areas of rangeland can thus remain untouched, while the herds have to fall back on another borehole.

It should also be stressed that the abandonment of herding and guarding practices, especially in the dry season, means that the animals do not make optimal use of the fodder resources available. As Bourgeot (1982) remarks: "The herd, which is gregarious by definition, has an in-depth knowledge of the pastures it usually consumes. This particular knowledge prevents it from adapting to other unknown pastures which are found on more distant rangeland". In other words, if animals are not driven by herdsmen, they tend to return to the same pastures and exhaust the grazing there before exploring other areas.

We should add that allowing cattle herds to wander freely means uncontrolled movements and poor management of pasture, under-grazed in some places and over-grazed in others, leading to environmental degradation (Reboul, 1978). While the pastoralists are clearly aware of these problems, they do not appear to be particularly worried. This is mainly due to the fact that the logic of extensive "gathering" types of pastoral systems is that value is only given to livestock and not to the resources which underpin herding activities. The comments of Barral's (1982) informants are significant in this respect; it is only when the animals return hungry to the camp that the herders realise that the "pasture is finished" and they must move on somewhere else.

This "regulation" based on indicators drawn from animal behaviour is not worthy of the name, as it does not allow the phenomena of rangeland degradation to be predicted so that action may be taken in advance.[3] This is not the only thing. The attitude of pastoralists towards the environment and the strategy worked out to exploit it are bound to have an effect on the performance of herding systems.

Observations made by Sharman and Gning (1983) about the feeding behaviour of cattle herds in the Ferlo region and the evidence we have gathered from livestock service workers bring us to advance the hypothesis that the heterogeneity of production levels achieved is the result of differences not in production targets

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[3] According to a personal communication from Landais, this behaviour is adopted in the most diverse pastoral societies, with results that few have thought to evaluate, but which are not as catastrophic as one might be tempted to suppose.

but in the herding techniques adopted. In other words, knowledge of these techniques is one of the main explanations for the diversity of animal production results and economic performance.

The identification of such techniques is a necessary prelude to a more detailed investigation. This work must pick out the main features of these techniques with a view to understanding their diversity. This was the aim of the herd movement survey whose results were compiled in accordance with two divisions: the whole of the survey area and the different socio-economic areas within it.

5. Rangeland management

In the Ferlo region, rangeland used to be managed at a higher level than the family unit. There were specific decision-making procedures for everything related to the distribution of land between agricultural and pastoral activities, the choice of dates for the beginning and end of the period of obligatory supervision of animals, the organisation of seasonal movements, etc.

Grenier (1956) recorded that herders from the same or neighbouring encampments got together at the beginning of each rainy season to herd their animals into the bush.[4] They formed groups of about ten herdsmen under the supervision of a leader who was responsible for choosing the destination (which pools and pasture should be used) and deciding on the timetable for herd movements.[5] These practices of bringing herds together and managing natural resources collectively have fallen into disuse. One no longer sees herds moving off together, except occasionally when forced transhumance occurs due to special circumstances such as the drought of 1983-4. In the same way, it is rare for regular users to get together to decide on the use of temporary water points and pasture within a specific area. This suggests that the occupation of land and use of natural resources are now an individual rather than a collective matter.

In actual fact, although this remark does apply to rangeland, it does not hold good for temporary water points for which the principle of collective ownership remains in force. It should be stressed, however, that control of these water points is no longer dealt with at the same level as before. "Large pools were

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4 These journeys mainly concerned the unmarried young men. Other members of the family group stayed behind to look after the crops and kept some milk cows with them.

5 According to evidence gathered in the 'kooya' region, the departure of the herds was the occasion for a race ('guldi nay'). Grenier (1956) says that the herders organised a festival upon their return "to wind up the rainy season". The festival mainly consisted of a procession of all herds from the same district in the presence of members of the community gathered to watch.

always common to several 'hurum', and in principle no-one had exclusive rights to use the water." (Barral, 1982). Such management of pools by several residential groups is gradually disappearing and being replaced by claims from the encampments to priority rights over the use of water-points within their living areas.[6]

Although regular users claim rights over the pools closest to their encampments, they do not take any action to prevent neighbours gaining access. 87.6% of herders surveyed say there is no system of pool management and that herds have free access, wherever they come from. On the other hand 5.6% say that there are precise rules regarding access, which are accepted by all regular users. This regulation of usage rights is practised in sectors where the influx of nomadic herds from Mauritania is substantial.[7]

The lack of control over surface water might lead one to believe that access to rainy season pasture is open to all livestock. In fact, rangeland management methods vary according to location. Most survey respondents (57.6%) stated that pasture in the immediate vicinity of the encampment is grazed first and above all by livestock belonging to residents. It should be pointed out that this right to priority use is not used against near neighbours. The pastoralists declare that the ruling protects them against influx of foreign herds into the area.

It is understandable that residents' rights should be strongly affirmed in areas traditionally visited by foreign herds during the rainy season. This is the case in the Eastern Ferlo, where 81% of respondents said that the ruling allowed rangeland adjacent to the encampments to be managed for the benefit of locally-owned livestock. By contrast, it is not really necessary to lay down rules for access to pasture in the region of the major boreholes, inasmuch as very few foreign herds enter the region during the rainy season.

Use of pasture in the "ladde" or bush region is totally unrestricted. Nine out of ten pastoralists say that these areas are supposed to belong to everyone and that there are no special regulations concerning their use. In actual fact, recognition of the public nature of "bush pastures" is purely notional around several boreholes. This applies particularly to the Matam Ferlo area, where the indigenous herders prevent foreigners from occupying the best pastures or setting up temporary camps there.

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6 In 1986 we counted 114 pools in the catchment area of the Mbiddi borehole. Most of the camps each have two or three pools which are generally reserved for specific purposes: livestock watering and family drinking water supply. Only 10% of all camps say they do not manage temporary water-points.

7 According to several pastoralists, pools remain polluted for some time after the passage of camels, making it impossible to draw drinking water.

However, such regulations have no legal basis and the herders are well aware of this. This is no doubt why they were careful not to mention it during the survey. So even in the Eastern Ferlo and Upper Ferlo valley, where foreigners are forbidden to stay in the bush, the majority of survey respondents (71% and 73,75% respectively) said that access to this rangeland is entirely free. Only a few of them (8.5% and 10%) mentioned any control being exercised by customary users.

The stereotyped nature of these responses, designed to obscure how natural resources are actually managed and used, demands that survey results be interpreted cautiously. In other words, it would be unsafe to conclude on the basis of the survey data alone that there are no rules governing rangeland management.

An appreciable proportion of survey respondents considered that fodder resources are not always available to livestock for two main reasons: lack of water (59% or respondents) and the extension of cultivated areas (6.7%). Difficulties linked to the expansion of agriculture are particularly marked in the Upper Valley (28.75%) and to a lesser extent in the Lower Valley (10%). 71.5% of pastoralists in the Eastern Ferlo mention the problem of water shortage. This is entirely logical in view of the low level of hydraulic infrastructure in the region. It is less so in the Lower Valley, where 62.5% of pastoralists complain of lack of water, whereas the area has a dense network of boreholes which, in the main, work satisfactorily.

Three-quarters of pastoralists consider that, overall, the rangeland is adequate to maintain the region's livestock. It should be noted that this point of view is shared to a large extent in the Eastern Ferlo and major borehole regions (87.5% and 79% of respondents respectively). Things are quite different in the Upper and Lower Ferlo Valley, where almost half the pastoralists consider rangeland to be insufficient because of the continual expansion of groundnut plantations and the influx of foreign herds.

For the majority of pastoralists, the underlying objective of rural land-use management is the promotion of agricultural and pastoral activities (56% of respondents). The principle of sharing out the land between the two dominant activities is especially applied in areas where Peuhl herders live alongside Wolof farmers. In the Lower Ferlo Valley, this cohabitation does not seem to pose any major problems and agricultural and pastoral activities fit together relatively harmoniously.

By contrast, in the Upper Ferlo Valley, where Mouride settlers have gained a foothold, the problem of mixing agriculture and livestock-keeping has led to sharp conflict between Peuhl herders and Wolof peasants. The extensive use on a vast scale of these agricultural settlements has led to encroachment on rangeland.

To avoid the risk of having to pay heavy fines if their animals should cause any damage to crops, herders tend to desert areas taken over by settlers during the growing season.[8]

In conclusion, it is in the areas where Mouride settlers and the highly mobile "egge egge" herders are found (in the Upper Ferlo Valley and Southern Ferlo in the case of the former, and in the Eastern Ferlo and Lower Ferlo Valley for the latter) that land tenure issues are high on the agenda and there is an outcry from regular users who intend to resist strongly any attempt to "confiscate" their land.

The reactions of the indigenous people are in fact tempered by the relative strength of the opposing sides. Peuhl herders are virtually helpless, faced with a wave of agricultural settlement directed from behind the scenes by the all-powerful Mouride marabout aristocracy, who enjoy the unconditional support of the authorities. The only way they have of countering the extension of groundnut cultivation is to seek recognition of their rights of ownership over land themselves. Herders in some rural communities in Linguère departement, such as Barkédji and Gassane, are thus seeking land registration in ever increasing numbers. The areas in question usually amount to several hundred hectares and sometimes even several square kilometres.

However, the pastoral communities' will to resist is blocked by the provisions of the national property law, covering criteria for land registration. In 1987, the departmental agriculture service in Linguère recommended "the suspension of land registrations over 20 hectares", considering that the pastoral communities concerned were "not in a position to develop the areas claimed" and were just trying to set up private pastoral reserves. Herding is not considered by existing land tenure legislation to be an activity which "develops" or improves the land and herders cannot therefore acquire land rights.

Although indigenous pastoralists cannot prevent encroachment by agriculture, they have managed to control the infiltration of groups of nomadic herders into their area by drawing up rules for access to grazing. The "egge egge" are not happy about this control and try to evade it by asking the authorities to abolish the priority usage rights claimed by long-established communities. However, it is unlikely that these demands will be met, as to do so would be to risk pushing a considerable proportion of the indigenous population into open revolt. There is also another reason: the "egge egge" do not constitute an organised social force, but are small scattered family groups making an isolated response to the difficulties they encounter. Knowing practically nothing about these people whose extreme mobility makes them elusive, the administration considers them to be an entirely marginal group.

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8 Because the herds are thus kept away from cultivated areas, 64.5% of survey respondents consider it superfluous to enclose fields in these regions.

6. Herding the animals

It should be noted from the outset that the Peuhl herd their animals more for security reasons (preventing them from getting lost or being attacked by predators or thieves) than due to any desire to supervise feeding or maintain livestock in accordance with any precise production targets. The proof of this assertion is that the pastoralists gave up guarding their cattle herds as soon as conditions allowed (political security, strychnine poisoning of predators and reduced mobility as a result of the installation of boreholes with mechanical water-drawing facilities).

44% of all pastoralists say they let their cattle herds wander freely throughout the year.[9] Pastoral work for them now consists of a few simple operations: chasing the animals towards the grazing areas or water points, supervising watering, transporting water to the encampment for young animals etc.

27% of herd owners only allow their livestock to wander during the dry season, as the need to protect crops during the rainy season makes strict surveillance essential. Daily herding of animals and surveillance throughout the year are reported by only 15.7% of pastoral units.

Shortage of labour is responsible for the abandonment of surveillance in only 4.5% of pastoral units. A secure environment and the reduced mobility of livestock seem to be the determining factors (27% and 18% of responses).

With regard to developments in husbandry practices in the different areas, it is interesting to note that guarding cattle has been generally abandoned in two areas which are quite different in agricultural terms: Eastern Ferlo, which is a major crop-growing region, and the areas where the major boreholes are located, where agriculture is of little importance.[10] This finding suggests that the abandonment of guarding practices is not linked to competition between agriculture and herding for scare labour.

Furthermore, it is in the Upper Ferlo Valley in particular that pastoralists say they are most concerned with the surveillance of their herds in the rainy season (58.75%). This is explained by the presence in the area of Wolof farmers who would not hesitate

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9 Asked why they did not watch over their animals, the pastoralists replied that this was no longer necessary because the major predators had been eliminated (27% of respondents). The other reason given was that the animals had become familiar with the terrain (18%) and no longer needed to be accompanied in their search for food. Only 4.5% of respondents said they had given up guarding their herds because of labour shortages.

10 67.5% of pastoralists in Eastern Ferlo and 58.5% of those in the major borehole region have given up guarding their cattle herds.

to impound any animals found wandering in unharvested fields. Finally, the Lower Ferlo Valley and Eastern Ferlo regions hold the largest proportions of herders sticking to the tradition of guarding their herds throughout the year (34.5% and 23.75% respectively).

Unlike cattle, goats and sheep do not wander freely, but are constantly watched over because of the risk of losses (straying, theft, attacks by jackals). Small ruminants are herded and guarded by 91% of pastoralists. Only 3.5% of the sample said they allowed their hords to wander at will.

Amongst sedentary Wolof people, small ruminants tend to be relatively well-integrated within the production unit. However, the animals are not herded by members of the family group. As a general rule, the animals from the village are kept together and watched over by a paid herdsman. By contrast, amongst the Peuhl, small ruminants are generally herded by family members: married or single dependents (32.6% of respondents), family heads (12.4%) and persons related to the family (6.7%). Resorting to wage labour, ie recruitment of salaried herdsmen to look after the animals, seems to be uncommon as it is reported by only 8% of family units.

To sum up, the advent of a safe environment and the installation of boreholes have contributed towards easing the main constraints which necessitated watching over cattle herds. This has led to an increasingly widespread abandonment of herding practices, with a consequent lack of interest by pastoralists in the rangeland and how their animals are fed. This is bound to have negative implications for livestock productivity.

## 7. Livestock mobility

The survey's interest in herd movements during 1988 is the result of a concern to understand the choices made by pastoralists and the practices which follow from those decisions. In order to grasp the logic behind decisions with regard to herding livestock, it is necessary to consider not only the pastoralists' aims, but also the availability of grazing resources.

In this respect, it is worth bearing in mind that plant production in the Ferlo region at the end of the 1987 rainy season ranged from 500 to 1000 kg dry matter per hectare, according to the CSE's estimates. In the absence of precise data, it is impossible for us to assess the extent of the areas burned in the region during that period. It is, however, obvious that bush fires destroyed pasture around several boreholes, thus obliging the herds to fall back on grazing elsewhere.

While the survey results do confirm the pastoralists' lack of interest in seasonal transhumance, recent developments have not put an end to this system. More than half (57.5%) of respondents say that their animals undertook no extensive movements during the 1988 dry season, against 38.5% who reported transhumance with their herds. The figures for transhumance were 53.5% in

Eastern Ferlo and 42% in the major borehole region, but much lower in the Lower and Upper Ferlo Valley (8.5% and 20% respectively).

27% of pastoralists said they had undertaken transhumance because of constraints linked to exceptional circumstances (lack of fodder due to bush fires, outbreak of disease etc). However, three quarters of those reporting transhumance indicate that this is common practice. It is mainly in the Upper and Lower Ferlo valley that these great seasonal migrations are a regular occurrence (83.75% and 67,75% respectively). Mobility is enforced rather than chosen in the other two zones where many pastoralists say they are basically 'sedentarised' and show little interest in transhumance in normal years..

During the 1983-4 drought almost all livestock were taken on transhumance, mainly towards the Southern Ferlo and Saloum regions. In the major borehole area, the high proportion of departures (92%) suggests a mass exodus. Fodder shortages were less severe in the Eastern Ferlo where 29.5% of pastoral units reported staying put, keeping all or part of their livestock with them. For reasons which are still unclear, more people reported transhumance in the Lower than in the Upper Ferlo Valley: 82% against 62.5%.

While large-scale transhumance does seem now to be a strategy to combat drought, one should not infer that livestock never move around in the Ferlo region in normal years. The animals can only be kept permanently in the catchment area of their home borehole under certain conditions, which are not always present, such as guaranteed food and water.

66.5% of pastoralists surveyed say that their animals are accustomed to move into areas served by neighbouring boreholes. There are two main reasons for this: pump breakdowns (40.5% of respondents and fodder shortages (20.5%). Pump breakdowns seem to occur more frequently in the Eastern Ferlo and major borehole region, where this reason is give by 75% and 72.5% respectively. A large proportion of pastoralists settled along the Ferlo valley think that movements towards neighbouring boreholes are motivated by the search for more abundant and/or richer pasture (Lower Ferlo valley 39% of respondents; Upper Ferlo Valley, 34%).

Livestock movements are accompanied by the whole or part of the family. Overall, 38.7% of pastoral units surveyed stated that they had travelled with all their members in 1987. Only dependents accompanied the animals in 22.5% of cases. 14.5% of respondents said that the head of family himself, the "joom galle", accompanied the animals on their travels, although they were actually herded by dependents.

Looking more closely, localised herd and family movements do not seem to be so common as Barral (1982) indicated. According to this writer, an analysis of pastoral mobility within the borehole catchment area showed that "there does exist a genuine pastoral nomadism which, unlike transhumance to distant areas, affects almost the entire population of the survey area".

Within the sample we surveyed, only 18% of pastoralists say they moved with their animals in the catchment area of their borehole. It should be noted that nomadic movements around the boreholes involved only a small proportion of pastoralists in the Eastern Ferlo and major borehole regions in 1988: 16.25% and 12.5% respectively. In the Upper and Lower Ferlo Valley, about a third of the pastoralists reported nomadic movements in their borehole area in 1987.

With regard to livestock feeding practices, 64% of respondents consider that the transitional period before the rains ("deminaare") is the most difficult of the year. Generally speaking, pastoralists share this opinion and explain this phenomenon by the gradual exhaustion of fodder reserves and the consequent need to travel further afield to find grazing.

Difficulties in meeting the animals' food requirements are also attributed to other factors such as an influx of foreign herds, especially in the Upper Ferlo Valley and Eastern Ferlo. The question of bush fires was of particular concern in the major borehole region (17.5% of respondents) and the Lower Ferlo Valley (11%). In this latter region, the pastoralists complain of the lack of a supply circuit for animal feed (43%). This is quite surprising in that the area is close to the main urban centres (Dahra and Linguère). Furthermore, it is served by a network of "bush-taxis" which provide regular transportation of people and goods. In our view, these complaints reflect the well-known phenomenon of distortion of information inherent in this type of survey.[11]

## 8. The pattern of seasonal herd movements

The flexibility of the Peuhl pastoral system and its ability to adapt to changing bio-climatic conditions are reflected in three main types of mobility: occasional journeys, seasonal mobility and daily movements.

The exodus of people and herds from the region during the episodes of drought in 1983-4 falls within a strategy of response to a particular set of circumstances, as does the practice of falling back on neighbouring boreholes as a result of bushfires, pump breakdowns or outbreaks of disease.

Unlike these movements, which are totally unpredictable, seasonal mobility is characterised by regular return to the same areas, if not the same pastures. In the Lower Ferlo Valley, for instance, nomadic movements around the boreholes involve only a very few animals, most pastoralists preferring to undertake transhumance to the agricultural areas in the South, where it is easier to sell dairy produce. In the near "jeeri" area, seasonal livestock movements occur in two phases. The cattle herds move into the

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11 Socio-economic surveys are seen by the people as a prelude to the establishment of development projects. Certain difficulties are therefore deliberately exaggerated in the hope of benefiting from external aid.

Eastern Ferlo when the first rains come. Leaving the rangeland at the beginning of the rain season encourages vigorous regrowth of the grasses. This movement, known as "polindaaji", is followed by another ("pettoji") which begins in the cool season and often goes on until the end of the hot dry season. These few examples show clearly that the scale and timing of seasonal livestock movements vary from one area to another in accordance with locally available resources and the potential of neighbouring regions.

Daily herd movements fall into a more or less regular pattern between the encampment, the grazing areas and the water points. According to Ba (1982), this represents a cycle "the first phase of which is movement between the encampment and the water point. Watering is accompanied by rapid grazing, which is almost always disjointed. The herds return at the end of the afternoon to complete the cycle. The second phase relates to movement between the encampment and the pastures. The animals leave the encampment very early and move slowly on to the selected pasture where they remain until midday. After a rest (in) the afternoon, they graze again before returning to the encampment at the end of the afternoon to complete the cycle".

In reality, the rhythm of movements over a year does not repeat itself exactly. The main reason for this is that the rhythm is dictated by conditions which vary greatly over time and which are the result of the conjunction of various parameters such as the nature and spatial distribution of fodder resources, the water source used, the location of the encampment, the livestock's watering requirements, the importance of dairy produce in the family's diet, etc. The pattern of daily movements thus differs from one season to another. These modifications represent a gradual adaptation of the grazing circuit (selection of pasture and water points) to environmental conditions, as fodder resources dwindle through the long months of the dry season (Milleville, 1982).

Unlike the dry season, which is the most difficult period of the year, the rainy season is one of plenty. As the first rains fall, family groups who have undertaken transhumance or nomadic movements around the boreholes return to their rainy season camps ("rumaano") and plant millet. The animals find both abundant surface water resources (temporary pools) and green pastures on the spot.

In this way, the search for food takes place almost entirely in the rangeland adjacent to the encampment, with water from the neighbouring pools. In the main, livestock movements consist of daily comings and goings between the livestock pound ("jofnde") close to the encampment, the pools and the outlying pastures.

After the morning's milking, the animals are sent off towards a nearby grazing area. Some pastoralists prefer to water cattle at the pool before sending them off to graze. At the end of the morning, the animals go to drink and then rest for a while. In the afternoon, they graze around the camp and come back to the "jofnde" at twilight for the evening milking. As a general rule, the animals then go off again to graze at night, watched by

herdsmen, and return before daybreak.[12] Because of the abundance of pasture and water, livestock movements occur in a relatively restricted radius (5 kms at the most).

After the pools and "céanes" have dried up in the cool dry season ("dubbunde"), the animals no longer drink every day. Most pastoralists consider that the animals only need watering every other day as the weather is generally cool. On watering days "naande jolooy", the herd grazes between the encampment and the boreholes. The next day, the fasting day "naande korroy", the animals go in search of richer pastures and cover distances of about ten kilometres on average.

As the hot dry season advances, fodder resources dwindle centrifugally around the water points and permanent encampments. The consequently longer journey to find pasture makes it impossible to arrange daily watering and also to bring the herd back to the camp every evening. It is noteworthy that even cattle herds which are not guarded at all during this period spontaneously fall into the rhythm of drinking every other day as soon as the distance between the rangeland and the water point lengthens. As one herdor from the Central Ferlo region commented: "Even if you chase the beasts towards the borehole, they will not go to the drinking troughs on the fasting day".

As the fodder reserves become exhausted, mobility becomes more taxing for both man and beast. "Because of the extreme heat, the animals require considerable amounts of water, but they cannot drink every day because they have to seek pasture far away from the borehole". At the end of the hot season ("deminaare"), the range of daily movement increases considerably (between 15 and 20 kms). This makes it necessary either to leave the encampment temporarily and stay with the animals on the rangeland or water them only every three days. This regime is extremely testing and pushes the animals to the limits of their physiological endurance

On watering days, after the morning's milking, the herders chase the cattle towards the borehole and harness the ox-carts to go there themselves. The animals do not graze much on the way to the water point; on arrival towards the end of the morning they drink and then rest a while. Before leaving, they drink again. "When they have had a good drink, the cattle are keen to get back to the pasture. The water gives them an appetite and they graze without stopping". In the evening, the animals split into two groups: the milk-cows return to the "jofnde" for milking, while the rest of the herd continues its search for food till late at night.

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12 Night grazing of cattle herds serves a dual purpose: ensuring adequate feeding for the animals on the one hand and, on the other, preventing animals which are not tethered in the evening from causing damage to cultivated plots. When they go to graze at night, the cattle never go in the direction of the wind, but walk in the opposite direction. "It's the wind that allows the animals to navigate in the bush thanks to their sense of smell."

On fasting days, the livestock graze early to take advantage of the cool of the morning. As the heat increases they stop browsing and rest in groups under the trees "jeertirde" in a pre-selected area. They begin to graze again in the afternoon, moving gradually closer to the encampment. At twilight, the whole herd returns to the "jofnde". After the evening milking the animals return to the pasture and sometimes only come back in the early hours. On the second fasting day the animals do not browse very much due to thirst.

There are several variations to this pattern which enable the herders to take account of different environmental conditions and the animals' food requirements.

In the Lower Ferlo Valley, the network of boreholes is so extensive that livestock may be watered daily throughout the dry season so long as the herders do not use the same water point constantly. On the other hand, in the Eastern Ferlo region where there are fewer boreholes, movements become very arduous as the pasture dwindles in the dry season. "When leaving the borehole, the cattle sometimes travel 5 or 6 kms without finding any grass to eat. They have to walk a long way to reach pasture. This is why the herd only comes back to the encampment the day after watering, or the day after that".

Generally speaking, this exhausting regime is the lot of all cattle except aged or milk cows and the very young. These animals are usually watered from the secondary hydraulic infrastructure (wells and "céanes"). This practice certainly requires considerable labour input, but it does enable certain types of animals to use the farthest pastures without having to undertake a tiring journey between the grazing areas and the borehole. For the same reason, a large proportion of small livestock is watered at the camp using water transported by cart.

The survey shows that families keeping livestock fall into three categories:

a) Indigenous Peuhl pastoralists: this group is characterised by the adoption of fixed encampments and a move towards semi-sedentary livestock keeping. All the same, these pastoralists retain their potential for mobility (movements restricted to the borehole catchment area in normal years and travel out of the area in case of natural disaster).

b) Nomadic herders: appearing as a result of episodic drought, these groups have no permanent base camps to speak of. Their mobility is extreme in order to maximise their chances of getting to the best pastures before anyone else.

c) Village agro-pastoralists: at village level there has been an overall tendency towards sedentarisation of livestock-keeping systems. It should be noted that specific husbandry practices are adopted for certain categories of animal (domestic sheep, draught oxen etc).

The particular husbandry practices and strategies within the various livestock-keeping systems need to be examined carefully to discover the logic behind the use of land and other natural resources. The unavoidable conclusion at the moment is that there is a contradiction between uncontrolled grazing leading to anarchic rangeland use and jointly taken decisions to set aside certain grazing areas for the pre-harvest season. This observation raises at least three series of issues:

- identification of the determining factors which interact with regard to pastoralists' behaviour and decisions. Some of these factors are common in the sense that they affect a series of pastoral units whose herding practices they tend to standardise. Others are more individual and contribute towards an accentuation rather than a reduction of the diversity of practices around a single borehole.

- analysis of developments in livestock-keeping and agricultural practices, as well as the logic behind the way resources are used.

  As Marty (1989) says, the question is whether current trends will lead to the emergence of new ways of controlling land-use. One may also wonder whether a real land-use strategy exists or whether current practices are merely the end-product of the adaptation of pastoral systems to social and natural constraints.

- comparison of the various strategies adopted, their relative success and the difficulties encountered. This implies assessing the impact of the various practices on the environment and the level of production attained.

## 9. Conclusion

In the main, the pastoral development strategies implemented in the Ferlo region have been based on environmental considerations. Research work in recent decades has concluded that the rangelands are over-stocked and generally over-grazed as a result of an increase in herd size exceeding the potential for balanced reproduction of fodder resources. With this in mind, decision-makers felt that viable, sustainable solutions to increased population must be sought in an intensification of natural resource use.

In order to achieve this aim, projects set up in the region adopted two complementary strategies: encouraging destocking to reduce overall livestock numbers, and supporting initiatives to organise pastoralists to control land-use and manage communal natural resources.

With regard to attempts to improve rangeland management, Boudet (1990) observes that the many experiments undertaken in the Sahel have by and large failed. "Whatever formula is adopted, rangeland management remains a vague notion, confined to an estimate of herbaceous biomass and a frequently illusory outline of ideal stocking levels."

This assessment is entirely relevant to the Ferlo region where it is clear that, beyond the social constraints inherent in any attempt to organise producers to control and manage grazing areas, the main problem in rangeland management is the abandonment of herd surveillance. What is the point of laying down rules for the management and rehabilitation of grazing areas if livestock can wander all over the place for most of the year?

The reduced labour input which characterises the current animal production situation poses the problem of the productivity of pastoral work. Is the reduction in labour time devoted to herding related to an increase in the productivity of pastoral work which is encouraging an increase in the size of the family herds? Or would it be more appropriate to interpret the low labour input into pastoral activities as the consequence of a refusal to undertake extra work which would not bring about a significant improvement in the herds' performance and productivity? We are currently unable to answer these questions. Only an in-depth study to assess the performance of herding systems with reference to the husbandry techniques employed can provide the means to test the validity of the various hypotheses.

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