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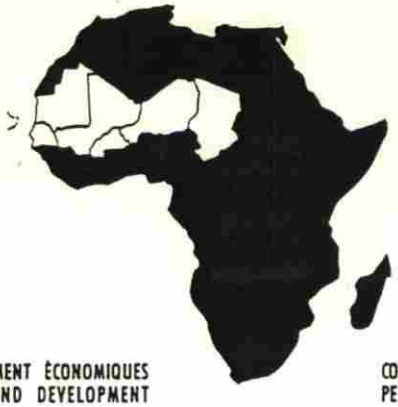

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ORGANISATION DE COOPÉRATION ET DE DÉVELOPPEMENT ÉCONOMIQUES
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CILSS
COMITÉ PERMANENT INTER-ÉTATS DE LUTTE CONTRE LA SÉCHERESSE DANS LE SAHEL
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LIVESTOCK ACTIVITIES IN THE SAHEL

Burkina Faso, Niger, Mali

The Sahelian Livestock Situation: Restrictions, Economic Role and Conditions for Development

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The ideas expressed and the facts stated in this study are the responsibility of the author alone and do not necessarily reflect the views of OECD, the Club du Sahel or CILSS

Key words: Agriculture; Animal production; Animal husbandry; Ecological balance; Land tenure; Livestock; Resources management; Forage crops; Grazing; Burkina Faso; Mali; Niger

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INTRODUCTION

> "In North Africa, Turkey and Iran, population growth and the expansion of agriculture are signing the death warrant of ancient pastoral practices. Certain Mediterranean regions have sufficient agricultural intensity, sufficient numbers of inhabitants and sufficiently dynamic economies to have imposed strict limitations on pastoral life."
>
> Fernand Braudel, "La Méditerranée"

Analogies must, of course, be drawn with great caution, but this quotation from Braudel to which Michel Bonfils refers in his recent work "Halte à la désertification", offers a fairly accurate picture of livestock activity trends in the Sahel.

Livestock activities are currently going through a period of deep-seated structural change, which the droughts of the 1970s and of 1983-85 brought to light and exacerbated.

This progressive deterioration of the livestock sector has been analyzed, discussed and investigated at various different levels. Sahelian governments have expressed concern over the future of their national economies' livestock sectors, either directly (as in Niger, where a national debate was organized at Tahoua in April 1985) or in liaison with the CILSS. "Program assessments" were carried out in early 1985 (Burkina Faso, Cape Verde, Gambia), and at the same time the Secretariat of the CILSS and the Club du Sahel constituted a group of experts to examine development in the light of livestock activities in the Sahel. In 1984, this group of experts reported that the data gathered formed an insufficient basis for recommendations, and proposed that an in-depth study be carried out on the trends in livestock activities over recent years. The aim of this study was to provide a sound basis for concrete proposals that would allow Sahelian governments and donor agencies to draw up effective livestock programs and policies (real participation in the economic development of the country, protection of the ecology).

The Secretariats of the CILSS and the Club du Sahel commissioned a preliminary study from the Dutch Agrobiological Research Center at Wageningen (CABO) and this establishment, in

turn, mandated Mr. Henk Breman, a specialist in livestock activities with considerable experience of Mali, to coordinate work and to set up an interdisciplinary team of experts to conduct the study. This team studied the situation in Burkina Faso, Mali and Niger - three countries that are considered representative of the different types of livestock activities that exist in the Sahel. The six members of the team (of whom two are Sahelians) visited the three countries in April and May 1985 and produced three reports, which were published jointly by the CILSS and the Club du Sahel in March 1986 (Niger), December 1986 (Burkina Faso) and April 1987 (Mali).

The make-up of the team was such that considerable emphasis was laid on the ecological and environmental aspects of the situation, as well as on animal forage, which is considered to be the key to the difficult problem of livestock activities in the Sahel.

I PAST DEVELOPMENT AND CURRENT SITUATION

Pastoral animal production systems, which were considered highly efficient in the past, are progressively breaking down. The severe droughts of the 1970s and 1983-85 amplified the incongruities within these systems and accentuated the contradictions that already exist between livestock activities and agriculture: high animal mortality, massive sales at low prices to new investors, the financial distress experienced by large numbers of pastoral herders, lengthy periods away from the village, exodus and migration towards the south and even abroad, reductions in the weight of animals and in herders' incomes, reduction in the proportion of GNP that livestock activities represent, and falling export earnings in this sector.

Drought is not the major cause of this crisis: it has merely aggravated it. As a result of social changes and population growth, livestock activities have exceeded the optimum limits set by natural resource availability, herders have lost control of the means of production (grazing land and herds), and at the same time the traditional market situation has undergone radical changes.

Drought amplified the degradation of the environment caused by over-exploitation of dry-season grazing land. These lands that were so useful to transhumant herds are being increasingly affected by the tendency to leave less land fallow, and to shorten fallow periods, and by the rapid, uncontrolled extension of areas under crop. The land tenure system is governed by vague legislation and relies on a tradition that is now being lost. The non-allocation of space to herders and the fact that herders are not involved in the management of available space have contributed to the expansion of agriculture. Traditional, experienced herders are increasingly ceding livestock activities to farmers and to investors who are starting to be known as "absentee herders". Throughout the Sahel, the ancient structures of pastoral society are breaking down and a large section of the pastoral population is becoming increasingly impoverished. Indeed, many herders can now survive only by becoming shepherds in the employ of investors, or else by turning to agriculture.

It is true that drought affects agriculture as much as it affects livestock activities, and overall production suffers as a result. In times of drought, however, prices of animals and animal products fall, while prices of agricultural produce and animal feed increase.

There is a general trend towards sedentarization. The center of gravity of the livestock sector is moving south, and at the same time productivity and efficiency are falling. Production conditions are actually less good in the south than in the north - forage is more abundant in the south, but it is of better quality in the north.

For a long time livestock development strategies concentrated first and foremost on animal health and water supply, to the detriment of forage resource management, which is crucial to productivity. The animal food situation, however, is very mediocre. Forage is often of poor quality because of low-grade soil. Low-quality food is the major obstacle to development, particularly in the dry season. The unit stocking density of the land is further decreased by the disappearance of perennial grasses, trees and shrubs and the general degradation of grazing land.

In this way, livestock activities have been pushed further and further back by the geographic expansion of agriculture, and, no longer able to rely on transhumance - the traditional method of optimizing the use of grazing land and natural resources in general - pastoralism is now seriously threatened. As a result, pastoralists are experiencing considerable social and economic problems.

Although livestock activities have become more popular with farmers - an indication of a deep-seated change, and a suggestion that the future of the sector will rely on the association of agriculture with livestock activities - productivity in the livestock sector as a whole is falling, because it is impossible to feed the animals correctly.

The future well-being of livestock activities in the Sahel relies chiefly on the intensification of agriculture, for this is the only way of producing animal feed of sufficient quality. Be that as it may, pastoral livestock activities still play an important role, and various measures should be taken to ensure that these activities continue in a balanced manner. Such measures include the preservation of transhumance where this is still possible, the conservation of a minimum of dry-season grazing land, and the restoration of rangelands in pastoral areas. In addition, social measures should be taken to provide assistance to pastoralists who are now forced to change activities. These measures will be costly to put into practice, and cannot succeed unless a determined approach is adopted by all parties concerned.

II RESTRICTIONS AND DETERMINING FACTORS

In addition to the harshness and uncertainties of the climate, livestock activities in the Sahel are faced with restrictions of various types:

- ecological: chiefly space, natural resources (water and forage), animals;
- socio-cultural: population, relationships between herders and farmers, organization of herders;
- economic: domestic market, export markets, the role of livestock activities in the overall economy.

1 Ecological factors

Space

The percentage of total space that is taken up by livestock activities has changed significantly over recent years as a result of two main external factors: the expansion of agriculture (in turn a result of population growth and falling yields), and government land tenure policy.

Herders now operate in an uncontrolled space, partly because the traditional land tenure system has changed. By and large, earlier systems placed the responsibility for land tenure on the shoulders of the representatives of local communities. In the south, the predominance of agricultural communities led to legislation centered on crop farming, while in the north, where pastoralists predominated, the use of water and grazing land was the major preoccupation. Agricultural space is made up of a mosaic of villages whose limits are fairly well defined, while pastoral space is "open": there are no clear, fixed limits. Pastoral land is interwoven with farmland, or is superimposed on that farmland if farming and herding coexist.

Local representatives' right to decide has now been compromised, particularly as a result of recent developments: population growth, the popularity of cash crops, expansion of areas under crops, breakdown of socio-political structures (authority crisis, emancipation of servile classes), and the progressive southwards movement of herders. The situation is particularly difficult in areas where grazing routes and transhumance routes are now under crop, not to mention the rice fields that have been established in the pastoral "bourgous" as is the case in Mali's inland delta.

This loss of control of pastoral space by groups of herders has been aggravated by the reduction in the overall amount of pastoral space available as agricultural communities expand in number and increase the size of their croplands, and, it must be said, as herders show increasing interest in agricultural activities.

Natural resources

The two main resources needed by livestock activities in the Sahel are grazing land and water.

Grazing land

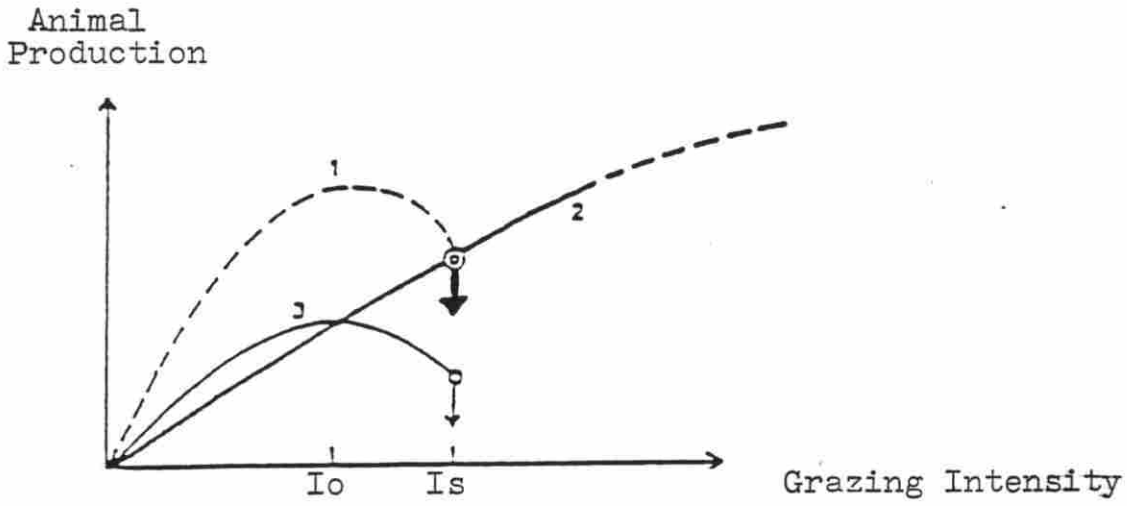
Natural grazing land is by far the Sahel's major forage resource. The herbaceous layer accounts for most of the biomass, but the tree and shrub layer is also an important source of high-quality forage for those animals that are capable of making use of it (particularly goats and camels). Agricultural by-products also make a contribution to the availability of fodder. Most of these by-products (millet, sorghum and corn stems, rice, fonio and wheat straw, cane waste and molasses) are of inferior quality, however, because of the limited use of chemical fertilizers.

In the three countries examined, the same worrisome observations were made on biomass reserves. Virtually everywhere, the herbaceous layer and the topsoil are degrading as a result of overgrazing and drought. Bare dunes are appearing on sandy substrates in the north, and water erosion is even more serious on silty soils. Further south, the disappearance of perennial grasses is particularly worrisome, and this phenomenon has been aggravated by successive droughts and more particularly by overgrazing by an animal population that has been rather hastily restocked, and that is larger than before in certain instances.

Rainfall has a significant influence on forage availability, but the quality of the forage is a crucial factor and plays a fundamental role in animals' growth patterns. As a sort of compensation for the harshness of the climate, forage is richer in nitrogen in those areas where rainfall is lowest. The most arid zone - the North Sahel - appears to offer the best quality forage over the year. The intermediate zone - the South Sahel - is the least favorable. In the savannahs further south, cumulative gains increase because the period during which animals gain weight is longer. In the north, therefore, forage resources allow for prolonged growth during the dry season, since nitrogen levels and digestibility are greater.

The graph and table below (pages 9 and 10) illustrate this variation in the feeding conditions and growth patterns of animals as a function of rainfall in the different zones. These figures demonstrate the negative influence of sedentarization on production per head of cattle, and the southwards movement (beyond the Sahelo-Sudanese zone) of the center of gravity of the livestock sector.

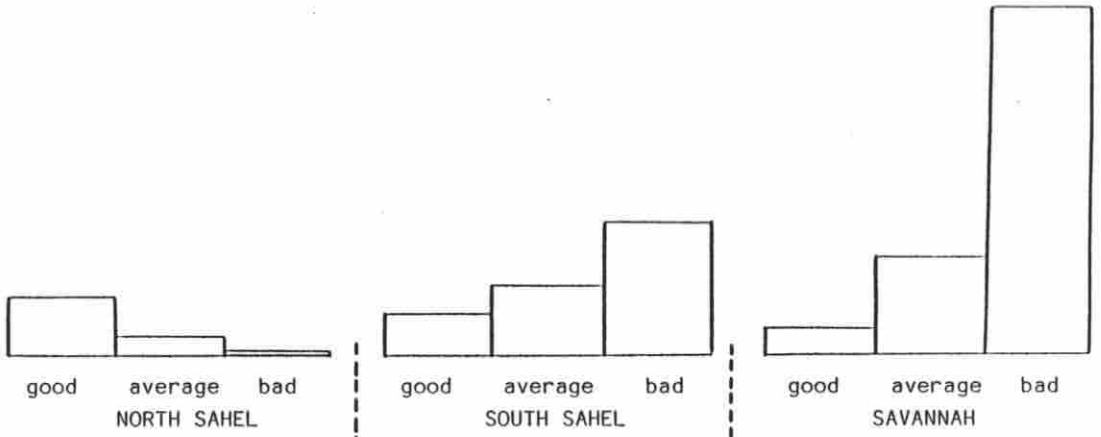
Overgrazing of rangelands allows animals to ingest as much as possible of the small amounts of nitrogen available in the grass. The pursuit of this useful but dangerous practice leads in many areas to a regrettable overstocking. The resulting grazing intensity is a negative factor for overall productivity of livestock activities and for optimum levels of animal production.



Animal production as a function of grazing intensity from different viewpoints; impact of action (point 1: imaginary ratio adopted by many livestock development projects; point 2: probable ratio for mobile livestock activities; point 3: probable ratio for sedentary livestock activities; Io = optimum intensity for sedentary livestock activities; Is = current overgrazing situation).

To counter the fall in productivity caused by over-exploitation of grazing land, herders tend to increase the number of animals they keep. This leads to a vicious circle whereby unit stocking density is further increased, and the productivity of the overall animal population falls as a result. Grazing land is not the only land that is degrading and being over-exploited. This distressing situation also involves trees and shrubs, which have been disappearing to the north of the 700 mm isohyet since the drought of the 1970s. The tree and shrub layer of the Sahel is severely degraded. In addition to increasing consumption of wood by a growing population in and around major cities, there is a general laxity on the part of herders and farmers. Trees are being cut back excessively and shrubs no longer have time to develop at all.

Quantity of forage according to quality in the three agro-climatic zones of the Sahelian countries



Weight increase as a function of rainfall and forage quality in the three agro-climatic zones

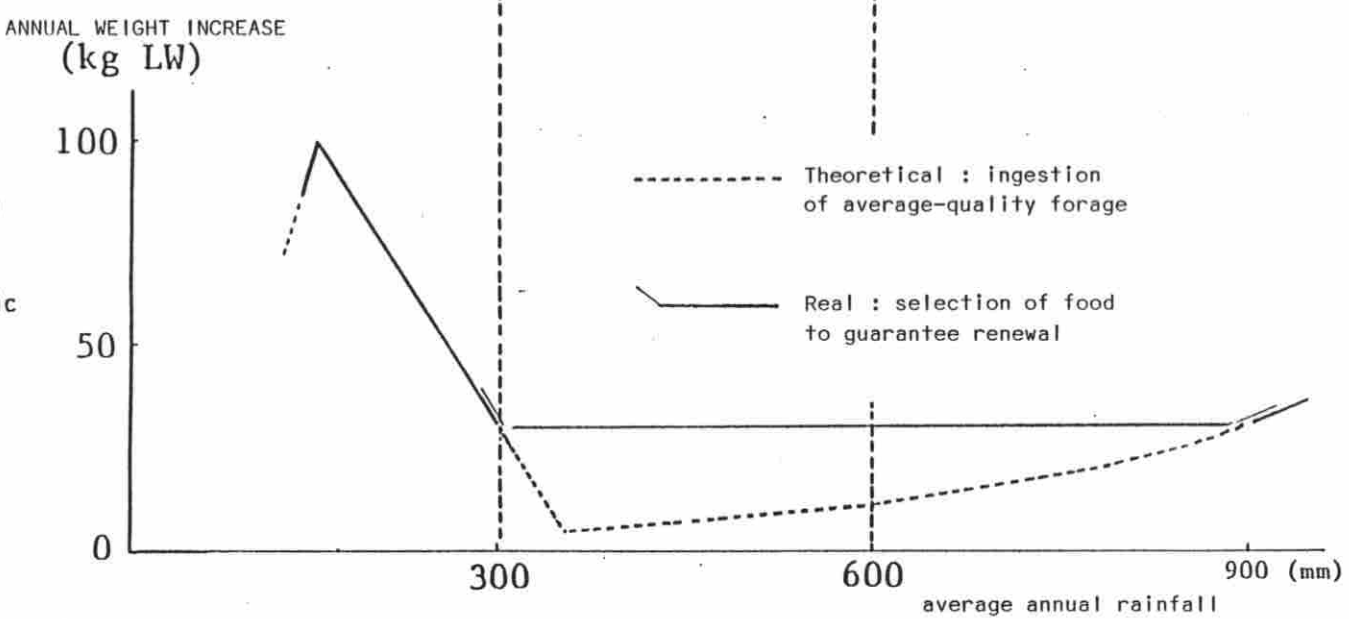


Table 1. Estimated weight increase/decrease (kg/month) of 150 kg weaned female as a function of nitrogen content of forage and availability of green vegetation

grazing land growth season (weeks)	average rainfall (mm)	NITROGEN VALUE OF GRAZING LAND	J	F	M	A	M	J	J	A	S	O	N	D	annual total
9	< 300	green vegetation	–	–	–	–	–	–	+	+	–	–	–	–	
		% N vegetation	0,9	0,9	0,9	0,9	0,9	0,8	3,2	2,5	1,3	1,2	1,1	1,0	
		% N ration	0,9	0,9	0,9	0,9	0,9	0,8	3,2	2,5	1,3	1,2	1,1	1,0	
		average increase monthly	2	2	2	2	2	0	23	23	14	12	9	7	
		annual													98
11	300-600	green vegetation	–	–	–	–	–	–	+	+	+/-	–	–	–	
		% N vegetation	0,55	0,55	0,55	0,55	0,55	0,45	2,7	1,4	0,9	0,7	0,55	0,55	
		% N ration	0,7	0,7	0,7	0,7	0,7	0,7	2,7	1,4	1,0	0,7	0,7	0,7	
17		average increase monthly	-4	-4	-4	-4	-4	-4	23	12	6	-4	-4	-4	
		annual													5
	600-1200	green vegetation	–	–	–	–	–	+	+	+	+	–	–	–	
		% N vegetation	0,35	0,35	0,35	0,35	0,35	2,4	1,4	1,0	0,8	0,6	0,35	0,35	
		% N ration	0,7	0,7	0,7	0,7	0,7	2,4	1,4	1,0	1,0	0,7	0,7	0,7	
		average increase monthly	-4	-4	-4	-4	-4	23	12	6	6	-4	-4	-4	
		annual													15
24	> 1200	green vegetation	–	–	–	–	+	+	+	+	+	+/-	–	–	
		% N vegetation	0,35	0,35	0,35	0,35	2,45	1,4	1,0	0,8	0,6	0,5	0,35	0,35	
		% N ration	0,7	0,7	0,7	0,7	2,4	1,4	1,0	1,0	1,0	0,9	0,7	0,7	
		average increase annual	-4	-4	-4	-4	23	12	6	6	6	2	-4	-4	31

Furthermore, good-quality by-products are often consumed by farmers rather than being used for cattle feed, particularly during periods of drought.

In addition, it appears that agricultural yields can but fall even further as more and more marginal land is put under crop, and increased cultivated surface area will thus not compensate for this loss of grazing land. The deterioration of this grazing land, or its outright disappearance in certain cases, will lead inevitably to an overall loss in food availability.

The natural conclusion is that over and above the measures that must be taken to safeguard the grazing land needed for mobile livestock activities, the development of livestock activities in the Sahel will rely first and foremost on the integration of those activities with crop farming, and on the intensification of the latter.

Water availability

Vital as it may be, water availability is not the principal restriction to the development of livestock activities in the three countries examined. The major importance that has been attached to water supply in the past has given rise to obvious excesses. All too often, the enormous investments that have been made in this field have taken only short-term humanitarian aspects into account. Such initiatives have sometimes been so simplistic that there have even been instances of cattle dying of starvation in the proximity of water supply schemes, since grazing land management has been totally overlooked.

The members of the team chose to examine the "minimum water requirement", i.e., the amount of water needed for the animal population to make use of all available forage resources. They consider it worthwhile to sink a well only if this minimum requirement cannot be covered by current water availability. If this approach had been adopted in the Sahel, it would have been possible to avoid many of the difficulties that have been encountered: excessive concentration of animals in one place, which is damaging to the traditional mobility that guarantees optimum grazing land management; overgrazing around wells and unreasonable increases in overall animal populations; etc.

Although the Tahoua debate (Niger) in April 1985 did not reach any clear conclusions on the controversy over whether water or forage is the chief limiting factor, the team of experts is confident that current water availability is not a limiting factor for livestock activities in the countries visited, with the exception of certain areas of Eastern Burkina Faso.

Animals

Improvements in animal production in the region should in general come through higher production per equivalent head of cattle rather than rises in overall numbers of animals. In the countries under examination, therefore, there are grounds for looking more closely at the genetic potential and health of the animals - vital factors in absolute terms, but of secondary importance in the Sahel - in addition to better food conditions and herd management.

Nutrition is nonetheless the major limiting factor. In large areas of the Sahel it is difficult, if not impossible, to achieve an annual gain of 50 kg for young animals in their growth cycle, after weaning, on the basis of natural grazing land. The lack of good-quality food for long periods of time is responsible for slow growth and thus for the advanced age of animals when they are ultimately slaughtered: for an animal weighing 100 kg one year after birth, 4 to 6 years are needed to achieve a live weight of 250 kg.

The lateness of the first calving, and the low rate of calving generally encountered in the traditional livestock sector, are due to the low level of food. By contrast, high mortality among young animals appears to be as much a health problem as a nutritional problem.

The team made a detailed appraisal of herd management, laying particular emphasis on the ways in which Sahelian herders optimize the use of their herds (age and sex pyramids, sales strategy, etc.) Sahelian herders in general know their jobs well, and weighted comparisons that have been made with livestock activities in the most deprived areas of Australia or the Western United States have produced fairly similar results.

Be that as it may, many families in the three Sahelian countries examined are now unable to live exclusively from their livestock. Globally, optimum use of available forage resources would rely on integrated exploitation of natural grazing land, agricultural by-products, the herbaceous layer, and the tree and shrub layer. This "integrated transhumance", as it is referred to by the team, would make it possible to increase animal production.

In the past, animal health was threatened by the epizooan organisms that decimated the Sahel's animal population. The availability of vaccines (millions of which are now administered each year) and progress in veterinary pharmaceuticals have brought considerable reductions in disease-related mortality. Livestock programs and projects have concentrated to a very large extent on the health of animals.

Despite the fact that deaths caused by food shortages, particularly during droughts, are far more numerous that disease-related deaths, the control of epizooan diseases still relies on a level of staff and administrative services that is disproportionate to the actual health situation. Large budget allocations are made to this sector, even if the funds are not always distributed in a coherent fashion (staff costs are disproportionate to equipment, infrastructure and treatment costs).

There is no doubt that there is a lack of coherence in each of the three countries examined between the low level of financing made available for forage resources and animal nutrition, and the considerable funds allocated to animal health departments. These departments are highly structured: numerous veterinarians and technical assistants, a central laboratory for vaccine production, veterinary pharmaceutical services to handle supplies of vaccines, etc. The cattle diseases encountered in the Sahel are of various types: viral (cattle plague, which was particularly deadly in the past, but which has was effectively brought under control some twenty years ago, although it is still latent); bacterial (bovine pleuropneumonia, anthrax, brucellosis, pasteurellosis, tuberculosis); parasitic (particularly trypanosomiasis, which affects bovines especially

in the humid savannahs). Small ruminants are sensitive to plague, and although considerably less attention has been paid to these beasts than to bovines, they are nevertheless vaccinated, particularly in Niger.

The damage caused by epizooan organisms has now been reduced to the extent that preventive measures and treatment are available (which is not always and not everywhere the case), but diseases caused by various nutritional deficiencies are infinitely more deadly.

Different species have received different amounts of attention. Most initiatives have concentrated on improving bovine breeds, and, to a lesser extent, breeds of small ruminants. Selection experiments conducted in various areas (notably, an effort to develop a more productive breed of Azawak zebu at the Toukounous station in Niger), as well as attempts to introduce foreign species, after running numerous tests, have led to interesting conclusions in many respects:

- Local breeds are not unproductive per se and their growth potential is exceptional when food conditions are optimum.
- In view of the food situation, food conditions are far from optimum (except for a short period in the rainy season), and the possibilities of increasing productivity through selection of local breeds or by cross-fertilization with foreign breeds are minimal.
- It is pointless to introduce foreign breeds before the food situation makes it possible to achieve between 1000 and 2000 kg of milk per lactation.

2 Socio-cultural aspects of livestock activities in the Sahel

Clearly, population growth does not explain everything, but the human population is growing so much faster than the economies of the three countries examined that demand is throwing the production system out of kilter. Population density now exceeds the stocking density of ecologically sound livestock and crop farming activities. Crops will inevitably replace livestock activities, unless agriculture becomes more intensive. In most areas, however, neither increases in the

animal population nor increases in areas under crop can offer a real solution to the food deficit.

It is instructive to examine the relative growth of different social categories, and the situation in Mali is fairly typical in this respect. The number of crop farmers in Mali is increasing much faster (+ 3% per annum) than that of nomads (+ 1.5% in the Kel Tamasheq population) and even than that of Peul agropastoralists (+ 2.5%).

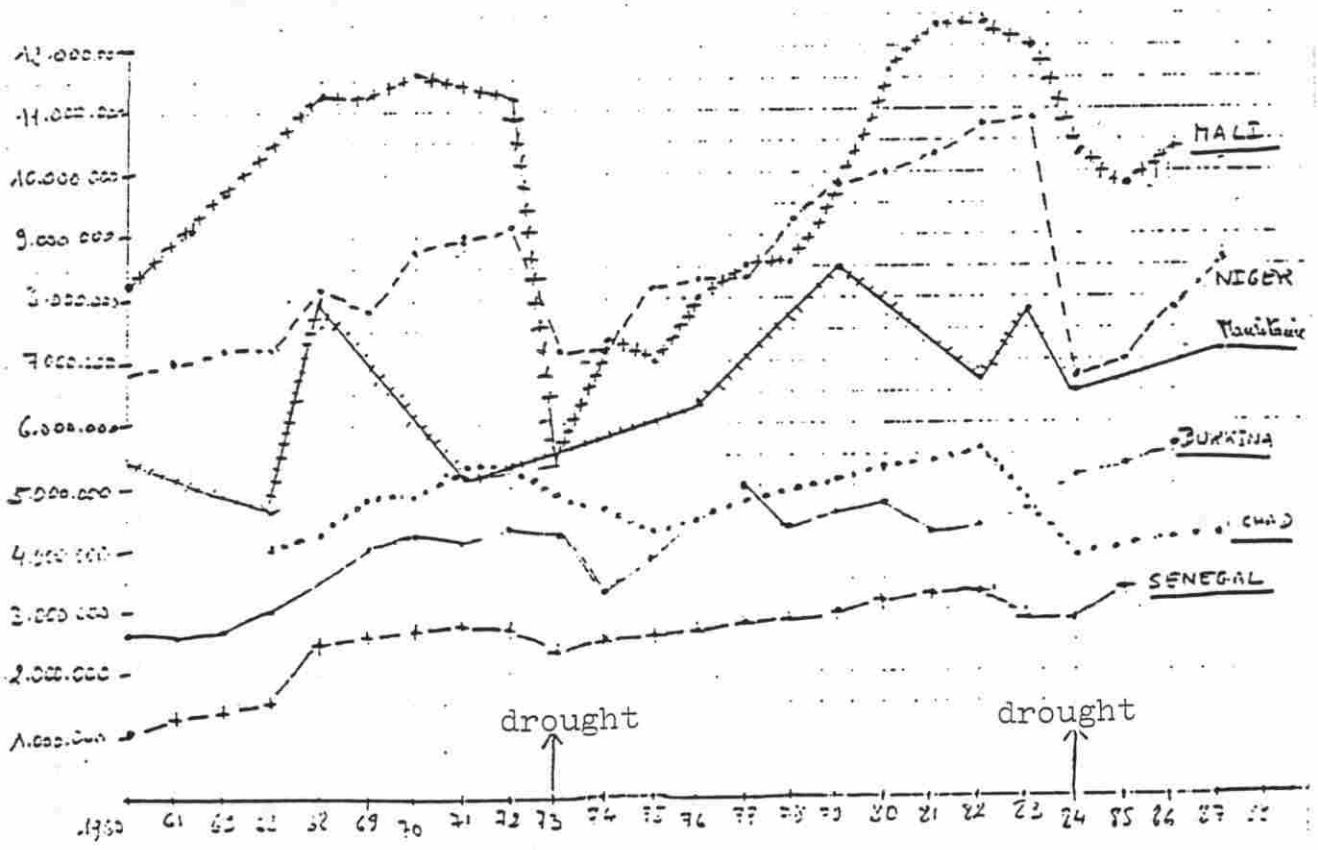
Relationships between herders and crop farmers have changed a great deal over the last fifteen years or so, as has the social status of each group.

In Niger, between 1968 and 1980, areas under crop increased by 50%. This rapid extension of the cultivated surface area in a region that had always been considered a predominantly pastoral zone has led to what can only be described as colonization by three different types of crop farmers: those from the south (Hausas in the Ader), former nomads that have settled south of the pastoral zone (Kel Gress in the Ader and the Gobir Tudu), and those practicing itinerant crop-farming within the pastoral zone. As in Mali, Niger's population growth is both exponential and sharply differentiated, and the dynamism of the society is inversely proportional to the degree of pastoralism. As in neighboring countries, the following negative factors can be criticized: occupation of the best dry-season grazing land; reduction of rangelands; conflicts between crop farmers and herders; disproportionate investment in cattle; the overbearing power of the State, especially in terms of land tenure; and the breakdown of traditional socio-economic structures. The government passed legislation in 1961 to set the northern limit for croplands (the 350 mm isohyet, parallel 15°10 N). Under this legislation, crop farmers were no longer eligible for compensation for damage caused by cattle if their activities were north of this limit. The idea was to safeguard a pastoral zone, but the law is no longer applied. Similarly, the agrarian reform announced in 1975, whereby land would be allocated to those who work it, has not yet seen the light of day in legislative terms. Pastoral population groups have thus been dispossessed of the management of their traditional living space and rangelands.

It should come as no surprise that more that half of the Sahel's animals belong to private investors: rich farmers, traders and civil servants. In Mali, for example, between 25% and 60% of the herds are owned by "absentee pastoralists", depending on the area. In addition, many crop farmers also invest in cattle, not only as fallback capital in the event of poor harvests, which is traditional, but also as a means of production in agriculture (animal power and transportation). During periods of drought, herders working for private investors are in an extremely vulnerable position, because prices of animals fall while prices of cereals rise. More than in any other Sahelian country, Malian farmers are attracted by animal-powered cultivation and the use of animals for transportation. Some 400,000 head of cattle are currently in the hands of crop farmers for these purposes.

The overall animal population in Niger has followed the same developments and distortions as in Mali. Agropastoralists now own fewer animals, while crop farmers and outside investors own more. The severe droughts of 1973 and 1984 hit the poorest sections of the population hardest (through increased running down of stocks), and particularly the nomads in the pastoral zone (63% losses of bovines in 1973 compared with a national average of 50%; 52% losses for all animals combined compared with a national average of 32%). At the same time, massive sales of cattle took place. Livestock board statistics indicate that the animal population of crop farmers grew by 30% between 1961 and 1980. Immediately before the 1984 drought, the distribution of Niger's overall bovine population was as follows: 20% exclusively in the pastoral zone; 60% in the agropastoral zone; 20% in the hands of newly settled herders. As in Mali, the climatic crisis of 1973 accentuated the differential with the south, and it is reasonable to assume that this situation was aggravated in 1984. Finally, it should be remembered that not only have there been basic shifts in the geographic distribution of cattle, but major changes have also taken place in animal ownership in the pastoral sector.

The rural exodus reached dramatic proportions in Niger between 1970 and 1977, with between 100,000 and 200,000 persons leaving the countryside each year. These departures for the cities and for other countries have continued to take place, of course,



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particularly in the aftermath of the 1984 drought. In general, the rehabilitation of dispossessed herders poses difficult problems in that those herders who are not employed by the new owners take refuge in the cities, where their integration is particularly hard.

Other distressing factors include the straying of cattle owned by sedentary population groups, which is an extreme example of poor management of grazing land, and the growing incidence of theft as animals come increasingly to be considered in purely economic terms, rather than as possessions of social significance.

Finally, the transfer of ownership of animals from the traditional herders to the new investors has taken place so fast and to such a large extent, and is of such basic importance, that it will sooner or later have negative social, economic and ecological repercussions on the entire livestock sector.

Despite this sudden, deep-seated change, however, it would be unfair to conclude that the total demise of mobile livestock activities is imminent. Even if these activities continue to become less widespread, they still play a major role in the economy. Indeed, traditional herdsmen and agropastoralists still have more cattle that do crop farmers, particularly in Niger and Mali.

3 Livestock activities and the economy

It should be pointed out in introduction that the economies of the three countries under study in many respects dictate conditions in their respective livestock sectors. The overall economy is not in the most favorable of situations, to say the least. Aside from Niger, which undoubtedly benefited from the uranium boom of 1975-80, each of these countries is faced with serious difficulties of similar types but of varying degrees in different areas. Since the uranium slump, Niger is now starting to experience the same problems as its two neighbors.

The countries' governments have extremely limited financing capacity. Much more discussion is devoted to austerity programs and restructuring of State-owned companies than to new

projects, which in any case could only be launched with large-scale assistance from the international community. Based as they are essentially on the primary sector, the economies cannot be expected to get off the ground: a growing number of people are very poorly nourished, unemployment is rife, domestic demand is growing only slowly, savings levels are low, the secondary and tertiary sectors and the opportunities they might hold are virtually non-existent, the regional economy is developing slowly, dependence on the outside world is increasing, not only to finance existing development projects, but also to maintain unwieldy bureaucracies and administrative services. Furthermore, these weak economies are vulnerable to the sudden changes in the Sahelian climate, which they tolerate very badly, as was witnessed after 1973 and 1984. Finally, with population growth outpacing economic growth, these countries have tended, despite considerable outside assistance, to dip into their capital reserves and erode their natural resources, particularly in the agricultural and livestock sectors.

In this unfavorable economic environment, livestock activities nevertheless occupy a place of appreciable importance, particularly in Mali and Niger. The role of the livestock sector should be examined from two viewpoints: first, in relation to the subsistence economy, and, second, in relation to the market economy (domestic supply of meat, milk and power), and in relation to exports.

Throughout the Sahel, increasing numbers of inhabitants are becoming involved in livestock activities, as a result of growing popularity among crop farmers and despite the migration of a proportion of the large-scale pastoralists. The marked rise in overall numbers of animal that has occurred over the last twenty to twenty-five years, even if this tendency is now slowing, and in certain cases has been reversed, has enhanced the role played by livestock activities within Sahelian economies. The current crisis has tended to hide this phenomenon, particularly as livestock activities have generally been considered to involve the pastoral and agropastoral sectors alone, as opposed to the agricultural sector. This separation of two different worlds, two social and economic categories in sharp contrast to one another, is no longer valid

today because of the profound upheaval that has taken place in livestock activities. No longer can the growing importance of these activities to crop farmers be overlooked.

It is interesting to analyze the overall animal population: changes in the breakdown of this population reflect the structural and circumstantial transformations that have taken place over the years (see table below).

Since the beginning of the 1960s, the animal populations of the five major livestock breeding and herding countries (Burkina Faso, Chad, Mali, Mauritania and Niger) have followed similar trends. The number of animals has increased everywhere over the last twenty-five years, except for bovines in Mauritania.

Taken as a whole, the bovine population grew by 15% between 1960 (16.55 million head) and 1984 (18.84). In Burkina Faso, Mali and Niger, the overall population rose from 8.8 million in 1960 to 11.4 in 1984 (+ 30%). Burkina Faso's bovine population increased most (+ 70%) to slightly over 3 million head in 1985, as a consequence of the country's southerly situation compared with Niger's. Niger is further north and, therefore, handicapped in terms of livestock activities. Mali is in an intermediate position with an increase of 40% over 1960 figures. This country had the largest bovine population in 1984 (4.9 million), ahead of Chad (4.25) and Niger (3.5). Mauritania is more arid that Niger and has been even harder hit, losing 53% of the 2 million head of cattle it had in 1960 and recording a bovine population of just 950,000 in 1984.

A similar observation can be made in relation to the sensitivity of the bovine population to drought conditions. This sensitivity varies according to the climatic and geographic conditions of the country. Mali and Niger were particularly severely affected by the 1972-73 drought, as were Chad and Mauritania. Burkina Faso, on the other hand, was less badly affected. Much of Mauritania's cattle population has moved south to Senegal, and this country now has considerably more bovines than its neighbor.

TABLE 2. TOTAL LIVESTOCK POPULATION OF PRINCIPAL SAHELIAN LIVESTOCK PRODUCING COUNTRIES

Number of head : million
EHC : million

COUNTRY \ SPECIES / Years		BOVINES		OVINES + CAPRINES		CAMELINES		EQUINS + ASINS		TOTAL	
		Number of head	EHC *	Number of head	EHC	Number of head	EHC	Number of head	EHC	Number of head	EHC
BURKINA FASO	1960	1,8	2,3	2,6	0,36	PM	PM		0,17	4,4	2,83
	1982	2,9		4,4						7,3	
	1985	3,4 (+ 70%)		5,4 (+ 108%)						8,4 (+ 90%)	
M A L I	1960	3,50	5,29	8,2 (11,25 en 1971)	1,33	0,16	0,30		0,45	11,86	7,36
	1972	5,74		8,62		0,24				14,6	
	1973	3,80		5,4		0,08				9,28	
	1982	6,7		12,4		0,3				19,4	
	1984	4,9 (+ 40%)		10,4 (+ 27%)		0,2				15,5 (+ 30%)	
MAURITANIA	1964	2		4,6		0,56		PM		7,2	
	1979	1,9		8,5		0,77				11,2	
	1984	0,95 (- 53%)		6,5 (+ 41%)		0,76				8,2 (+ 14%)	
N I G E R	1961	3,5	2,77	7	1,08	0,35	0,41		0,52	10,85	4,78
	1972	4,2		9,15		0,34				13,7	
	1973	2,2		7,1		0,28				9,6	
	1982										
	1983	3,5 (=)		10,9 (+ 56%)		0,41				14,8 (+ 37%)	
SENEGAL	1960	1,74		1,02		PM				2,76	
	1971	2,67		3,36 (1982)						5,4	
	1984	2,2 (+ 26%)		2,95 (+ 190%)						5,15 (+ 86%)	
C H A D	1963	4		4		0,35				8,35	
	1972	4,7		5,2		0,56				10,46	
	1973	3		4,9		0,54				8,44	
	1983	4,9		4,75		0,48				9,13	
	1984	4,25 (+ 6%)		3,95 (#)		0,46				8,66 (+ 4%)	
TOTAL Number of head	1960-63	16,55		27,42		1,42				45,42	
	1983-84	18,84 (+ 15%)		40,1 (+ 46%)		1,83 (+ 29%)			1,14	60,71 (+ 34%)	
EHC	1982 (B.F. + Mali + Niger)		10,36		2,77		0,70				14,97

EHC : Equivalent head of cattle (250 kg live weight).

Ovines and caprines have grown in number in a similar fashion, although increases are even more pronounced. In 25 years the overall sheep and goat population rose by 46% in the five countries taken together, increasing from 27.4 million to 40.1 million head. In Burkina Faso, Mali and Niger, the overall increase was even sharper, from 15.4 million head in 1960 to 26.7 million in 1984 (+ 73%).

The economic value of the animal population as a whole considered in terms of usable meat, and irrespective of species, is expressed in "livestock units" or "equivalent head of cattle" (EHC) (1). One EHC is equivalent to a bovine with a live weight of 250 kg. For the three countries under consideration, the overall livestock population was estimated in 1982 at 15 million EHC, of which bovines accounted for 10.4 EHC. In terms of weight, therefore, bovines represented two-thirds of the overall animal population.

Mali's livestock resources in 1982 were as follows: 7.36 million EHC total, of which 5.29 from bovines (72%), 0.64 from ovines, 0.69 from caprines and 0.3 from camelines. Niger's figures are as follows: 4.78 million EHC total, of which 2.77 from bovines (58%), 0.34 from ovines and caprines, 0.4 from camelines, 0.28 from equines and 0.24 from asinines. For Burkina Faso, the figures are as follows: 2.63 million EHC total, of which 2.3 from bovines (81%), 0.36 from ovines and caprines, and 0.17 from equines and asinines. Together, the three countries possessed some 15 million EHC, of which 10.4 from bovines (69%), 2.77 from ovines and caprines, 0.7 from camelines and 1.14 from equines and asinines.

The reconstitution of the animal population after the two severe droughts should not mask the realities of the situation. Despite a very different geographic distribution of livestock and a marked increase in the animal population in the south, the total number of animals has now probably stopped rising. The progression observed over the last few decades has gradually slowed due to saturation, and productivity has fallen. Animals have generally lost weight. The most vulnerable countries are seriously afflicted or threatened by this profound crisis in the Sahelian livestock sector. Within

(1) "Unité de bétail tropical" (UBT) in French

each country, including Burkina Faso, which is in a relatively favorable position, entire regions have been placed under intense stress.

Although it is a difficult task to attempt to evaluate the development that has taken place in the years following the recent drought, during which vast numbers of animals perished, it is reasonable to extrapolate from trends that had begun to take shape even before 1984. The proportion of small animals is increasing, the number of animals in the pastoral zone is decreasing, and cattle is moving south.

It is difficult to gauge whether the meat requirements of the domestic market are being met. According to certain statistics, average per capita meat consumption appears to have fallen over the last twenty years. During this period, the overall animal population grew until 1984, but not as fast as the human population, which almost doubled.

Correlated to the total human population of these three countries (20 million), the animal population is equivalent to an average of two animals (0.75 EHC - slightly less than 200 kg live weight) per person. For these notions to have any real economic or social significance, however, they should be examined in the light of other factors, and particularly productivity, which is far from ample. Nevertheless, the figures do give a rough idea of the role played by livestock activities in the Sahelian economy.

Over the last twenty years, livestock activities and agriculture alike have become more and more implicated in the market economy. Earlier, it is true, herders supplied the local market and exported some of their animals, but for many herders animals were the key to virtual self-sufficiency. This move towards the market economy affects herders more in terms of the domestic market than export markets.

When assessing the level of trade flows between herders and consumers, supplies to the new townships that have sprung up around the major cities can be considered as exports. It is highly probable that the nation's overall financial income from livestock has increased in real terms over the last few decades, despite the difficulties. But the distribution of this income has changed a great deal, as a result of population

growth and the deep-seated transformations that have taken place within the sector, and in particular the discontinuity between animal ownership and livestock management. Although very few reliable statistics are available, supplies to domestic markets do seem to have increased significantly. The number of animals slaughtered gives a fair indication of the developments that have taken place. In Mali, in 1960, 65,000 bovines and 140,000 ovines or caprines were slaughtered compared with 198,000 bovines and 360,000 ovines and caprines in 1984. In Niger, the number of animals slaughtered has risen substantially from 56,000 bovines and 600,000 ovines and caprines in 1960 to 110,000 bovines and 950,000 ovines and caprines in 1984. Burkina Faso has followed the same pattern, and animals slaughtered have increased particularly sharply since 1983. In 1960, 43,000 bovines and 79,000 ovines and caprines were slaughtered, compared with 168,000 bovines and 694,000 ovines and caprines in 1985.

Cattle exports to the coastal countries are traditional and poorly controlled. It is difficult to gauge how these exports have developed because the incidences of fraud and clandestine border crossings are very numerous. The statistics published by the Sahelian countries do not tally with those published by the importing coastal countries. Nevertheless, the southwards flow of bovines, ovines and caprines is substantial, particularly in periods of drought. Burkina Faso exported 382,000 animals in 1973 and 176,000 (including 50,000 bovines) in 1985, while Mali reached its peak in 1984, exporting 141,000 bovines and 496,000 ovines and caprines. Similarly, Niger exported 337,000 animals in 1973 (including 179,000 bovines) against 197,000 (including 65,000 bovines) in 1983. It should be pointed out that the long Niger-Nigeria border is extremely "permeable" and the statistics quoted are probably very much lower than real figures.

Exports of carcasses have fluctuated in a similar fashion during the same period, but have never exceeded more than a few hundred tons of meat for any of the three countries studied. This decrease compared with the 1950s is a result of the increase in meat consumption in Sahelian cities and, more particularly, the availability in major coastal cities of more competitive meat from Argentina or even Europe.

On various occasions, these developments have taken public leaders by surprise. In Niger, for example, a large, modern slaughterhouse was built in Niamey in the hope of benefiting from increased meat exports to the coastal markets. Today this facility is seriously under-used, generates high running costs and is a heavy financial burden for the government.

In the three countries studied, public-sector bodies that have been set up to export meat have experienced difficulties and have generated losses for the public finances. Finally, in Burkina Faso, the increase in export tax on cattle (from 250% to 600% between 1975 and 1980) has clearly not favored foreign trade, at least through official channels.

III WHAT CAN BE DONE TO COUNTER THE CRISIS AND DEVELOP LIVESTOCK ACTIVITIES IN THE SAHEL?

As a result of pressure from the international organizations that have come to the rescue, attempts have been or are being made to introduce reforms and re-organize the sector. The tasks in hand are not easy, if only because the Sahelian public leaders (government officials, civil servants, members of State-owned companies) are both defendant and jury in the cases brought under scrutiny. Governments are not satisfied and the donors are worried. Most of the projects that have been launched, particularly those aiming to provide support for the livestock sector, have failed because they have been conceived outside of any coherent national strategy. Nor are the Sahelians solely responsible for this failure. The team of experts mentioned, for example, that the "Niger Center-East Livestock Project" (rangeland management), which is financed by the World Bank, and the "Integrated Livestock Project" coordinated by USAID have had to be redefined because they were not adapted to the fundamental basis on which the mechanisms of pastoral survival rely: mobility.

Examination of the current situation in the Sahelian livestock sector and of the many restrictions with which it is faced reveals the complexity and the difficulty of the problem. Positive points are few and far between, and governments are unaware of many factors. What can they do to combat the uncertainties and rigors of the region's climate? Moves to

control population growth will, in any case, only bear fruit in the medium to long term.

Despite the complexity of the issue and the relatively weak position in which the sector finds itself today, however, there are clear indications as to the steps that should be taken to improve the situation, and it does seem feasible to take action now that will be effective in opening up opportunities for the future.

Agriculture is the leading edge of the region's economy. This sector is expanding, even if that expansion is relatively disorderly and is taking place to the detriment of traditional livestock activities. Agriculture will increasingly integrate livestock activities, because such is the natural evolution of agrarian civilizations. If this evolution is ultimately to be beneficial, the production of sufficient quantities of good-quality forage is essential, as we have seen. To achieve this aim, considerable progress must be made, and more sophisticated farming systems must be introduced. The only possible solution is that agriculture become more intensive, for that is the only way of feeding the animals correctly, which is the pre-requisite for good productivity.

Does this mean that traditional livestock activities in the Sahel are condemned? Large-scale nomadism is on the decline, of course, and the mobility of pastoralists is becoming increasingly hampered or threatened. However, aside from the fact that certain areas of the north will never support agriculture, mobile livestock activities must be maintained wherever possible. Action must be taken to slow the decline of the nomads. Transhumance is the best way of making optimum use of forage resources, and this practice must be safeguarded as much as possible. To achieve this objective, various steps should be taken with a view to protecting dry-season grazing land, ensuring that cattle routes are respected, etc.

Public services should, where possible, bring their policies on resource allocation into question so that loans, staff and projects are more suitable for the priorities of the moment. In this way, for example, instead of allocating the majority of funds made available by government and donors to animal health and pastoral water supply, it would be more appropriate at this

stage to concentrate on the most urgent aspects of animal nutrition: restoration of grazing land, rational management of natural resources, the use of chemical and organic fertilizers, and better use of under-exploited areas.

It would also be useful to gradually break down the traditional barriers between agriculture and herding. This is more than a semantic question, and involves attempting to change underlying mentalities. These two worlds were in sharp contrast in the past, but are now becoming increasingly interdependent. All actors in the livestock sector must become aware of the change that has taken place, and must endeavor to take care of the animals and of everything connected with them, whether they are in the hands of pastoralists, agropastoralists or the crop farmers who now practice stocking activities.

A few basic points should be made about the different lines of action that are considered potentially instrumental in re-establishing the Sahelian livestock sector:

Resource management: Bringing a halt to the degradation of natural resources would be a major victory, and to achieve that aim, several lines of action would be effective: reducing the overall animal population, stopping animals straying into cropland, fighting brush fires (which should be considered with care, however, since these fires are not particularly harmful if they are carefully programmed, as the nomads are well aware), and increasing water availability.

The opening up of under-exploited areas: Despite the generally excessive stocking density of the areas used by livestock, here and there in the region there are areas that - for a number of reasons - are under-exploited. If adequate investment and moves were made to bring the amenities needed to these areas, livestock activities could expand to a certain extent. The team of experts studied these possibilities in detail and examined profitability, with particular emphasis on Mali and Burkina Faso.

Grazing land management: The output of grazing land can be improved, either through regeneration, which returns land to its earlier levels of potential, or through transformations, which increase that potential. Capital investment capacity is the major limiting factor here.

The most promising method of improving large areas of natural grazing land, without making it necessary to restructure the entire livestock sector to make it more intensive, would be to use phosphates to stimulate nitrogen fixation by the leguminous plants that either already exist or that could be introduced in the region.

Despite the cost of these operations, they are a prerequisite for the necessary regeneration of the grazing land that is needed, whether this involves the use of phosphates to re-introduce perennial plants, plantation of trees or shrubs, or protection and control. Studies carried out in Mali on the introduction of leguminous plants suggest that this solution should be considered with caution.

Integration of livestock activities with agriculture: Integration appears, at first sight, to offer mutual advantages: agricultural by-products on the one hand, manure and animal power on the other. But, in fact, agriculture benefits considerably more from integration than do livestock activities.

The fact that agriculture is currently in competition with livestock activities should not necessarily be condemned. Faced with exponential population growth, agriculture is a better way of making use of natural resources than livestock activities. Cattle are particularly useful in agriculture, and stocking activities have met with considerable enthusiasm in Mali, for example. To feed their cattle, farmers are obliged to use natural grazing land, as agricultural land is insufficient, except in cotton- or groundnut-growing areas. Is it reasonable, therefore, to speak of mixed agriculture, given the large amount of additional grazing land that is needed? Integration implies mixed activity in a smaller surface area, and the only solution is thus to encourage the intensification of agriculture.

The intensification of agriculture seems to be one of the solutions to the current difficulties. To intensify agriculture, inputs in the form of nitrogen and phosphates are needed in order to increase yield. Since it is not feasible at this stage to switch totally to the cultivation of leguminous crops, whose natural processes would fix the nitrogen that is

needed, there is a need for chemical fertilizers. This increase in agricultural inputs would intensify agricultural production, and livestock would become more intensive by the same token, the race for space would be attenuated and the land needed for pastoral livestock activities to survive would be liberated in the process. Fertilizers would be just as beneficial to food crops (particularly cereals) and cash crops (cotton, groundnut) as to grasses and leguminous plants (niébé, for example).

Rotation of cereals crops with crops that improve the soil, combined with the use of phosphates, thus seems to be the option that should be recommended in the first instance. Integration of livestock activities with this type of agriculture is liable to increase agricultural output.

Other action: In addition to the lines of action mentioned above, initiatives should be taken to improve training of herders and crop farmers, to foster regional cooperation (particularly with a view to favoring exports of animal products, distributing chemical fertilizers, setting up rural financial institutions, and restructuring livestock aid) in an effort to develop a clear strategy and adopt a more coherent policy.

In conclusion, it can be said that before it is possible to find a way out of the current crisis and to develop the Sahel's animal production in the future, the following points must be accepted:

- There is only a faint hope of intensifying animal production in pastoral zones and transit zones through improved management programs and through specific investments. Nomadism will continue to exist on the edges of the Sahel, because this is the best way of optimizing the use of the few resources that are available.
- The agricultural zone, with its potential for producing additional by-products to be used as cattle feed, offers the best chances of success for any program aiming to improve output from livestock activities, on condition that farmers, with government assistance, succeed in intensifying agriculture. This will not be an easy task.

Investments in the pastoral sector should aim first and foremost at restoring forage availability by bringing a halt to the deterioration of rangelands. Further, these investments should aim to maintain animal populations at suitable levels and to ensure that an optimum breakdown by species is maintained. At the same time, social action must be taken to help rehabilitate herders or to help them resettle.

The future of the agricultural and agropastoral sectors depends on the introduction of a mixed agricultural system, and the developments that have already started to take shape should be encouraged. Everything that helps perpetuate the historical separation between traditional farming devoted to the production of crops on the one hand, and livestock activities on the other, should be discouraged because this separation has been superseded by the natural course of events and is now in sharp contradiction to the economic realities of contemporary rural life.