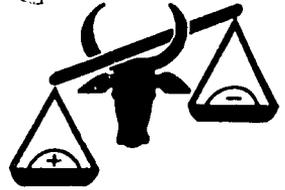


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**PASTORAL LIVESTOCK LOSSES AND POST-DROUGHT REHABILITATION
IN SUBSAHARAN AFRICA: POLICY OPTIONS AND ISSUES**

by

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Introduction

1. This paper examines post-drought rehabilitation policies to aid recovery in pastoral livestock production in Africa. The semi-arid zones where pastoralism is the main activity have been particularly vulnerable to the droughts of the 1970s and 80s. The consequences of drought for livestock-keeping groups are severe because of the long period required for livestock numbers to regain their former levels after heavy losses. The paper starts by describing the main impact of drought on livestock production and the consequences of this for the national economy. It goes on to consider the range of policy options open to governments and development agencies in this area and the problems associated with each one. The provision of credit to herders to aid in the reconstitution of livestock holdings is then examined and the particular issues associated with the implementation of such projects. While this paper concentrates on pastoral livestock production, it should be remembered that livestock also play a crucial role in a number of farming systems, particularly those in which animals supply draught power for ploughing and dung for soils manuring. Drought losses of work oxen will adversely affect harvests in the post-drought period. These issues are discussed in detail in Toulmin (1985) and will only receive brief treatment here.
2. This paper focusses on policies which may be carried out in the short to medium term to mitigate drought-related losses, working on the assumption that losses of a certain magnitude have already taken place. Thus, it is not concerned with pre-drought measures, such as early warning systems, or long term policies, such as changes in the management of pasture and water resources.
3. Rehabilitation will mean different things to different people. For example government may consider rehabilitation to have taken place once the size of the national herd has been re-established. However, individual herders may not yet have re-established their pre-drought position and for them the need for rehabilitation remains. Rehabilitation should not necessarily mean the restoration of the exact situation which existed before the drought took place. Rather, it can more usefully be interpreted to mean the re-establishment of general levels of production and incomes for drought-affected parties, be they governments or pastoralists, along lines which may in detail differ significantly from those that existed before the drought took place.

Drought-induced livestock losses

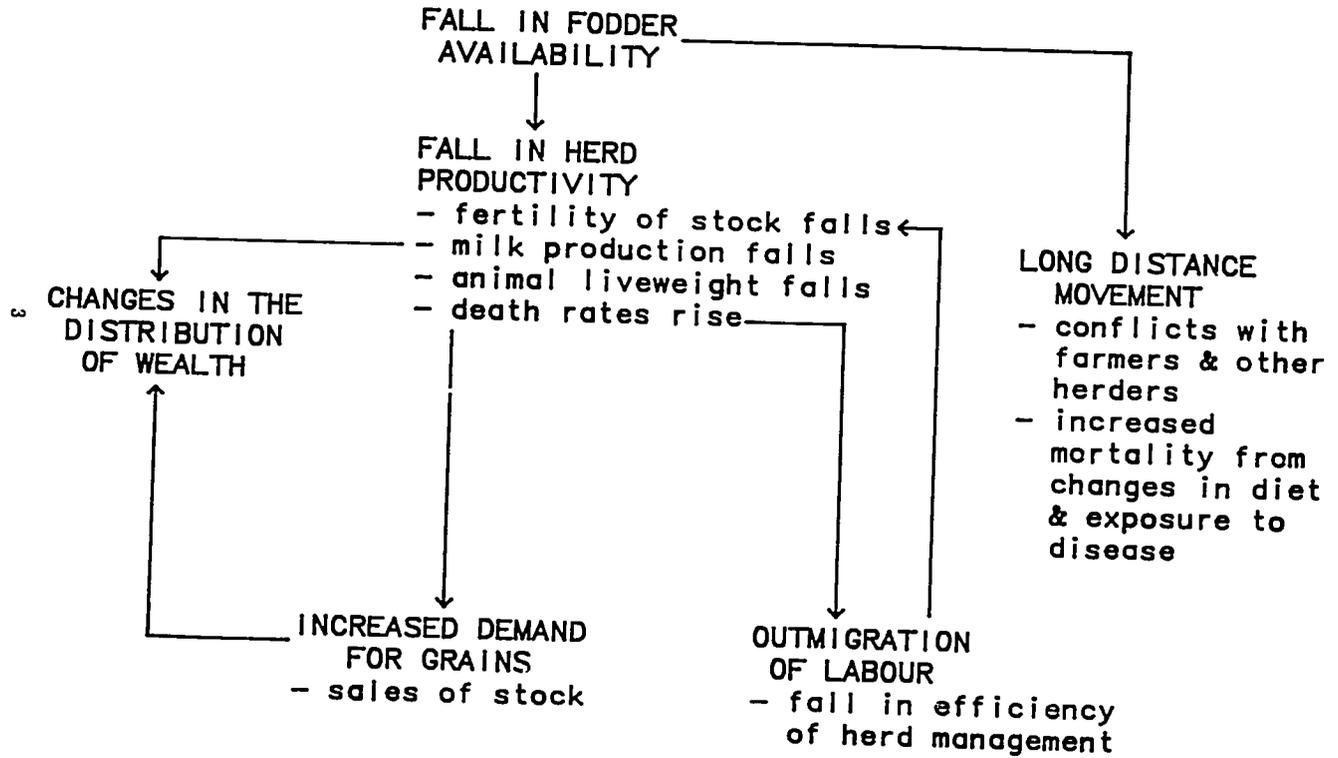
The pastoral sector

4. Figure 1 summarizes the major effects of drought on pastoral areas, the importance of each item depending on the intensity of the drought and patterns of livestock production and marketing. The immediate effect of drought on pastoral production is a decline in fodder availability. Where herd numbers are already close to the maximum carrying capacity, this fodder shortfall will affect levels of animal nutrition, causing a fall in milk supplies, calving rates and animal liveweight. Deaths among stock will start to rise as the period of drought lengthens and fodder scarcity intensifies. Pastoral households will need to buy more grain as milk supplies fall, leading to higher sales of stock. Stock sales will increase further as herders seek to salvage some value from animals before they die. Herders' purchasing power will diminish as livestock prices start to fall and grain prices rise, forcing herders to sell ever increasing numbers of stock. Initially the least productive animals can be sold (young male or elderly female animals) with little effect on herd productivity. However, as drought conditions continue, many herders will be forced into sales of breeding stock, a strategy which indicates a situation of acute stress, since females represent herd capital, on which the future growth of the herd depends. As a result of continuing sales, an increasing number of people will be unable to feed themselves from their herd and must look to other sources of support, such as farming, migration elsewhere to earn money, sales of assets such as gold, etc. In the extreme case, the pastoralist household loses its entire livestock capital and becomes destitute.
5. Following the drought, those households with some surviving stock will find their income and wealth substantially diminished for a number of years while their herd numbers slowly rebuild. Although sheep and goat holdings reproduce fairly rapidly, larger stock such as cattle and camels take much longer to re-establish their former numbers. Thus, for example, small stock numbers will take between eighteen months and 3 years to reconstitute following losses of 30-40%, whereas a cattle herd will need from 10 to 12 years to recover after a similar level of loss.

The national economy

6. Recent droughts in Africa have greatly reduced the national herds of several countries. The Niger cattle herd is estimated to have fallen by 62% over the

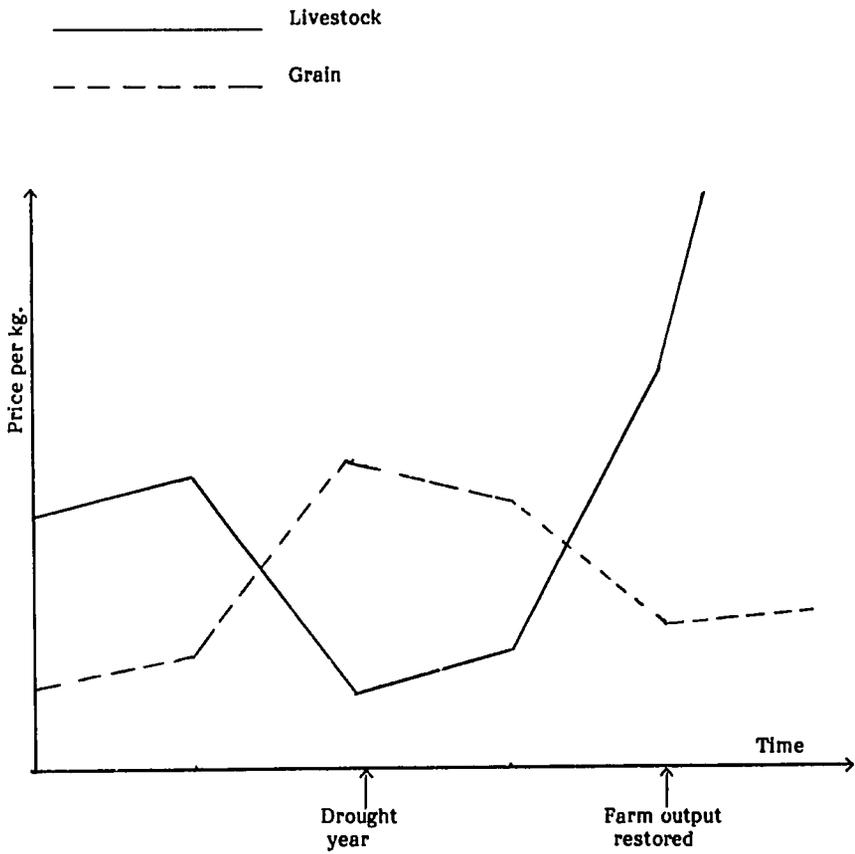
Figure 1. Effects of drought on pastoral areas



period 1982-84, from a population of 3.5m head in 1982, while that of Botswana fell by 20% over 1981-84, following 3 years of drought (FAO, 1984). This reduction in national herd numbers has implications for the country's ability to satisfy future demand for domestic and foreign markets in the short to medium term, as herd numbers will take time to re-build. The government will also suffer a loss to its income from the tax it normally raises on livestock-related activities.

7. Figure 2 shows the relative price movements of livestock and grain typically found over the years spanning a drought and the subsequent period of recovery. Falling stock prices during the drought are caused by rapid increases in offtake as herders sell off many of their animals. Livestock markets are usually unable to cope with the large increase in animals supplied in years of drought, due to lack of transport and storage facilities, so that prices fall even further. In the post-drought period, price levels for all stock are likely to rise as domestic and foreign demand is faced by a low rate of offtake from herds depleted in the former period. Prices will be especially high for those species and classes of stock in particular demand, such as sheep and goats, valued for their rapid rates of reproduction, and for female stock of all species. As can be seen from the diagram, grain prices rise during the drought year but fall in the subsequent period as harvests recover, following the return to normal rainfall. Where the farm sector has experienced heavy losses among work oxen, the speed of recovery in the post-drought period will be slowed down and grain supplies will take some years before returning to former levels.
8. The increase in domestic meat prices following a period of drought may be substantial. For example, urban meat prices in Mali doubled over the first half of 1975, following losses of stock estimated at 30-35% over the previous two years. This large rise in price occurred despite efforts by the government to set a controlled price for meat and a short term ban on the export of livestock. Data from Niger (Sutter, 1982) shows a tripling of prices for an average export bull from 20,000 FCFA in 1974 to more than 60,000 FCFA in 1977. Meat prices in Ndjamena, Chad showed a parallel trend, quadrupling over the five years from 1970-75, (Tyc, 1976) compared with an increase in the general price level of 20-30% per year over the same period (ILCA, 1979).
9. The external trade balance is also likely to suffer from a drought-induced shortfall in livestock production. A fall in the size of the national herd reduced

Figure 2: Relative price movements of Livestock and grain over drought period.



the number of animals available for satisfying export markets as well as domestic demand. In addition, disease problems may be aggravated by drought, because of the ensuing large scale movements of stock between areas. These disease problems will lead to the closure of certain markets with stringent health requirements. The way in which the stock shortfall is distributed between domestic and export markets will depend on a variety of factors which include income and price elasticities of demand in the two markets, changes in income levels, inflation rates, the degree of substitutability between animals destined primarily for the domestic as opposed to external markets and government interventions (such as a ban on exports) aimed at shifting stock in one or the other direction. If a strong level of urban demand exists, this may absorb most of the available offtake from herds in the immediate post-drought period so that livestock exports fall by an amount far greater than the percentage drought losses of stock.

Comparing the impact of policy measures

10. This section examines a range of policy measures for aiding the post-drought rehabilitation of the livestock sector. It will concentrate on pastoral livestock production. In this respect, there are two important points to be raised. First, while policy is normally equated with direct intervention or institution of indirect measures by government to counteract the adverse effects of drought in this context, one must realize that pastoral livestock owners in Africa have historically tried to employ their own strategies to reconstitute herds and minimize drought-induced losses of income. Such strategies include: extended search for better pasture in more distant locations outside the usual transhumance circuit; outmigration of some household members to earn additional income; undertaking supplementary production activities in conjunction with herding; conversion of large stock into rapidly reproducing small stock; and acquisition of animals from other households through different livestock "loan" systems (see Toulmin, 1985 for more details). Government policy which does not recognize such strategies at the herders' level can potentially hinder the achievement of post-drought rehabilitation objectives at the national level.
11. Secondly, government policy-makers will need to keep in mind both the balance to be maintained between various forms of aid to pastoral as opposed to other drought-affected parts of the economy and the linkages between activities

in each sector. For example, a programme to help re-establish crop production after drought, by providing credit for farmers to buy new work oxen, will have important consequences for livestock owners. Initially such a programme will result in an increase in the demand and price for young male animals to be used for ploughing but subsequent restoration of normal harvests to pre-drought levels will induce a fall in grain prices. Herd-owners will benefit from this shift in the relative prices of livestock and grain.^{1/}

12. The five areas of policy formulation to be discussed here are outlined in Table 1. Each policy has a particular aim and a range of instruments through which it hopes to attain its aim. Policy aims may conflict, as when exports of livestock are promoted at the expense of domestic consumption. The political objectives of government must determine the weight to be given to such conflicting aims. Within each policy area, there are a variety of instruments which vary in terms of their cost, distributional impact, spill-over effect, and administrative and institutional requirements. These are discussed in more detail below.
13. All policy initiatives involve expenditure in one form or another, whether it be by financing credit to herders or by reducing export duties on stock. Set against this increase in expenditure the following points should be considered:
 - (a) external finance may be available for some of these policies, as when foreign aid is available to fund a credit programme for herders.
 - (b) there will be costs to the government from not taking action, as when a destitute population must be given relief supplies,
 - (c) in the longer term revenue is likely to increase once livestock production has returned to its former level.
14. In the short-term, the impact of the various policy measures, listed in Table 1, on the government budget, external trade, producers and consumers can be positive, negative or neutral. It is obviously expected that most of these policy measures affect the government budget negatively as they will require additional expenditure outlays by government to implement them. In fact 17 of the 19 measures listed will have a negative impact on the government budget in the short-term. As would be expected from a government policy geared toward the post-drought rehabilitation of the livestock sector, livestock producers will benefit from most of these measures in terms of either reduced costs which they would have incurred if there were no government intervention

(e.g. items 2b, 3a, 3b, and 4b in Table 1), or compensatory income or consumption to make up for drought-induced livestock losses (e.g. items 2c, 2d and 4a).

15. Livestock producers will be negatively affected by measures that ban exports or slaughter and remove or reduce alternative opportunities for earning income (e.g. items 1c, 1d, 5c), or increase producers' selling costs (e.g. items 4c items and 5d). Consumers and the external trade sector will be negatively affected by most, of the measures except by those which clearly favour the domestic meat market or the livestock export market under policy aim Items 5 and 4 respectively.
16. As mentioned earlier, the above discussion on the impact of policy measures on different sectors of the economy considers only the likely effects in the short-term. Obviously the longer term impact is an extremely important issue but its assessment is also rather complex. In some instances, the policy measures themselves will have reversed their short-term negative impact on a particular economic sector to become positive. For example, a ban on the export of female stock will reduce foreign exchange earnings in the short-run, but over a period of years, other things being equal, this ban is likely to promote faster reconstitution of herds and a more rapid return to pre-drought levels of livestock exports. In other instances, the measures themselves will have to be phased out once the policy in question has achieved its short-term aim. For example, government subsidised distribution of grain or dry milk to herders will have to be discontinued once the pressure on herders' income or consumption needs has been reduced to a level which removes the danger of excessive sales of stock.
17. In still other instances, several real constraints will not allow government to continue to apply certain policy measures whose long-term impact will de facto cease to exist. In this respect it may be more appropriate to speak about long-term repercussions whose directions of impact depend upon numerous factors. Some of the more important characteristics of the policy options represented by the measures outlined are discussed below while the major constraints faced by governments in their choices among possible policies are briefly presented in a subsequent section.

Table 1. Policy Measures to Rehabilitate Livestock Production

POLICY AIM:	POLICY INSTRUMENT:
1. Reconstitution of livestock capital at national and local level	<ul style="list-style-type: none"> (a) Distribute credit to herders for them to purchase livestock (b) Government or agency buys animals for distribution to herders (c) Ban on export of female breeding stock (d) Ban on slaughter of female breeding stock
2. Reduce pressure on herders' incomes to prevent excessive sales	<ul style="list-style-type: none"> (a) Reduce livestock taxes (b) Subsidise distribution of grain or dried milk to herders (c) Develop non-pastoral sources of income, such as irrigated farming (d) Raise livestock prices paid by government.
6 3. Raise productivity of livestock sector	<ul style="list-style-type: none"> (a) Subsidise distribution of supplementary feed to pastoral areas or to meat fattening schemes. (b) Fund improved animal health programme.
4. Promote export of livestock	<ul style="list-style-type: none"> (a) Subsidise exports of livestock (b) Reduce taxes and other export costs (c) Increase taxes on domestic meat consumption (d) Impose direct controls on domestic consumption, e.g. rationing
5. Favour domestic meat market	<ul style="list-style-type: none"> (a) Lower taxes on domestic slaughters (b) Subsidise domestic consumer prices (c) Ban export of stock (d) Raise export taxes (e) Subsidise imports of meat

18. Policies aiming at a single objective differ greatly in their distributional impact, depending on the policy instrument used and the course through which it achieves its effect. For example, the promotion of livestock exports can be achieved either by offering relatively higher returns to producers and traders in export markets (such as by subsidising exports or reducing export duties) or by imposing a mixture of taxes and controls on domestic sales and slaughters which shifts livestock into the export sector. In the latter case, producers will suffer a net income loss, since the diversion of stock from domestic to export markets has been achieved through direct controls rather than by providing superior price incentives. Similarly, the government might impose a ban on the export of female stock, in order to retain surviving breeding animals within the country. However, policy-makers should recognise that this ban will lead to lower domestic prices paid for stock and will put further pressure on herders' incomes, leading to increased sales by those in greatest distress. An alternative means for retaining breeding stock within the national herd should be sought, for example by reducing the need by herders to sell female stock. The range of instruments under policy aim (2) could therefore be considered.
19. There are usually a variety of policy instruments open to government to achieve a desired aim. These are not necessarily alternatives to each other and may be used in combination. Thus, pressure on herder incomes can be reduced by a mixture of policies which includes the abolition of livestock taxes, the provision of cheap grain supplies and the development of supplementary income sources.
20. Policies vary in the size of their spill-over effects into other parts of the economy. Some instruments achieve their aim fairly precisely with the minimum of side-effects while others have a substantial impact on other factor and product markets. Spill-over effects should be kept to a minimum since they cause unintended changes in relative price levels and incentives affecting the efficiency of resource use in other sectors of the economy. For example, the most precise way of helping particular herd-owners reconstitute their livestock holdings would be to identify the particular herders it was intended to aid and to supply them with animals or the credit with which to purchase stock. Less targeted measures would include increased provision of livestock health measures and the provision of subsidised inputs to all herd-owners. Policy-makers may face little choice but to adopt a broad-based policy with considerable spill-overs where they lack the administrative infrastructure

to pursue a more focussed policy.

21. The administrative costs of policy implementation cover a wide range, there being in general a trade-off between the precision attainable and the cost of achieving this. For example, it could be argued that livestock tax relief should apply only to herders with the smallest number of stock, tax being levied once herd size rises above a certain level, this graduated schedule providing relief only to those most in need. However, the assessment and collection of livestock tax is sufficiently problematic in many countries already, without the additional demands on administrative staff that such a graduated tax system would require.
22. The probability of receiving external funding will differ between policy measures. Foreign donors are usually more willing to fund direct interventions in the livestock sector than to provide general financial support to the government budget.
23. Policies differ in terms of their timing, the speed with which they can be implemented, and the period over which their impact occurs. Certain actions, such as the abolition of taxes on livestock numbers or exports, can be taken immediately. Others will take much longer to implement if they require the setting in place of a new administrative structure. The latter might be the case where government policy aims to control the movement or prices of animals.
24. A comparison of policy options should also include an explicit assessment of the costs of not taking action in a particular field. In the five policy areas looked at here, the costs of inaction are composed of an extension of the time period with below average livestock production, leading to reduced opportunities for income and employment for part of the population who must as a result depend on others for support (be that from the state, famine relief agencies, family support systems, etc.), a reduced taxable base, lower export earnings and higher domestic prices for output from drought-affected sectors of the economy. The financial, economic and social costs of inaction are high. However, as the events of 1984-85 have shown, it is often easier for governments to obtain relief food supplies from abroad than finance for longer term development programmes. The receipt of food aid reduces the direct cost to the government of not taking measures to aid the rehabilitation of the livestock-producing sector.

Constraints on choice of policy measures

25. The above points illustrate the varying characteristics of policy measures aimed at restoring different aspects of livestock production, in terms of their costs, spill-overs and distributional impact. Particular governments will be faced by additional constraints on the choices to be made between possible policies. These constraints are imposed by limited resources, poor marketing and administrative infrastructures (leading to weak control by government of trade flows within the country and to foreign markets), weak institutional development at the level of producer organisations and political constraints imposed by the need to act in the interests of certain groups.
26. Resource constraints. Almost all policies require the direct allocation of funds for their implementation and many of the policy measures listed in Table 1 are costly in administrative and material resources. By contrast, inaction makes no immediate demand on the government budget, though its longer term cost may be much greater in terms of foregone output, incomes and foreign exchange earnings. One resource likely to be in particularly short supply is foreign exchange. Thus, policy measures which rely on using exportable commodities (such as agro-industrial by-products, like cotton seed or groundnut cake) or on importing goods (such as meat or grain) should be looked at with particular care. Foreign exchange limitations are relaxed where finance is available through grants-in-aid from external donors.
27. Marketing and administrative structures. Several of the policy options outlined in Table 1 involve government intervention through control of prices or imposition of taxes and subsidies. Such intervention requires that there be an administrative structure through which the government can act effectively. In practice, few governments have the required degree of control over markets and livestock movements to carry out many of the policies shown in Table 1. Thus, for example, it is estimated that only a small proportion of livestock exports from Ethiopia and from the Sahelian states actually pass through official export channels. Most animals are taken across borders illegally, given long frontiers which are difficult to police effectively except at great cost. By contrast, Botswana meat exports are channelled entirely through the Botswana Meat Commission, the official exporting body. This high degree of control is made possible by the high prices paid to producers by the BMC. On-the-hoof exports of stock to neighbouring states are of negligible importance.

Control over domestic slaughtering is less complete as many of these take place in rural areas. Prospects for policies aimed at re-directing livestock flow between export and domestic markets are far greater for a country like Botswana, where movement of animals within the country is also tightly controlled in order to comply with the quarantine requirements for imports by the European Community. Other countries have set up parastatal bodies intended to give governments a greater degree of control over livestock marketing, though these have usually driven a larger share of market activity into the uncontrolled sector. Thus, Stryker (1974) reckons that attempts to intervene in the Malian livestock market, over the period 1960-68, were largely nullified by the ability of merchants to displace their activity to other locations. Similarly, the short-term ban on the export of various categories of stock from many Sahelian states after the drought of the early 1970s led to a dramatic fall in controlled livestock exports but probably led to a substantial increase in illegal exports of stock.

28. Institutional development at the producer level. The structure of the livestock sector differs between countries. In the case of Botswana, 15% of the cattle are held by large commercial farmers and 85% by smaller herd-owners in the communal areas. In Ethiopia, the traditional farming sector accounts for about 70% of the nation's cattle population, most of the rest being held in rangeland areas while State Farms are of significance in certain areas. In most Sahelian states, livestock are in the hands of both pastoralists and farmers, although an increasing proportion of animals are thought to be held by non-traditional producers (traders, civil servants, teachers, etc.) who invest in cattle as one asset within a wider portfolio of investments. Different patterns of ownership imply differing herd management objectives and supply responses to changing market conditions. The structure of production, mean herd size and form taken by producer organizations affect both the options open to government to intervene successfully in this sector and the extent to which producers can themselves lobby governments in support of their own interests. A network of herder co-operatives, for example, provides a framework within which credit and other inputs can be channelled to herd-owners. In their absence, active intervention in the livestock sector becomes much more administratively costly as systems for the allocation and distribution of resources must be established.
29. Political constraints. All governments depend on particular groups for their support, whether it be the army, middle classes or commodity producers of

critical importance to the economy. Almost all policy measures are likely to affect the distribution of welfare within society, whether this be by changes in relative prices or by changes in employment and income prospects for certain groups. On the whole, the power of the urban professional class has tended to ensure that priority be given to the level of food prices in urban markets. For this reason, most governments would be reluctant to adopt policies leading to domestic shortages of key commodities such as grains and meat.

Herd reconstitution projects: An example of policy intervention

30. This section will present a discussion of an example of government policy intervention in the post-drought recovery of the livestock sector. It will specifically examine a number of current or completed credit programmes aimed at helping herders to reconstitute their livestock holdings following drought losses. In this connection, it will examine issues related to particular implementation problems involved in the schemes and questions of cost and return in considering alternatives to herd reconstitution.
31. Details of the credit programmes considered are summarised in Table 2. The availability of detailed data on these projects was poor. Consequently, much of the information in Table 2 refers to planned expenditure rather than the actual cost and livestock distribution per household. Sources for data in Table 2 are given at the end of this paper. All of the 9 schemes described in Table 2 involve the distribution of loans or of animals to herders, with the objective of restoring, at least partially, their livestock capital and their sources of income. Several of the projects were designed specifically for destitute herders who remained in famine relief camps through the lack of alternative sources of support. In most cases, livestock had been distributed on credit rather than on gift basis, but repayment performance has been poor and aggravated by continuing drought. In all but one case, relatively few animals were distributed per household, the stock being intended to supplement other sources of income rather than to be the single predominant income source.
32. Several important issues arise from a comparison of these schemes which relate to:
 - (i) the scale of the operation,
 - (ii) the institutional framework within which it is carried out.
 - (iii) the alternatives available to governments, agencies and populations if a herd reconstitution programme is not carried out.

Table 2. Projects Giving Credit for Herd Reconstitution

Scheme	Number of animals allocated per household and species Mix	Average cost per household and no. of households	Framework of scheme
Tin Aicha NE Mali	1-3 cows, 1-3 sheep, depending on size of household	US\$165 for about 200 households	Part of settlement scheme for destitute nomads
Relance du Mouvement Cooperatif NE Mali	5-10 small stock, largely goats	US\$75 for 5,000 households	Part of programme to re-establish herder co-operatives, including setting up grain reserves, irrigation etc.
Oxfam Gourma Mali	29-30 small stock	US\$450 for 45 households	Part of wider programme to establish herder associations grain stores, credit fund.
Government of Niger	Average of 1 cow, 1 sheep, 2 goats	Average of US\$ 140 per household	Herd reconstitution scheme funded through the Caisse Nationale de Credit Agricole
Oxfam/ Habbanaae Niger	2-3 cattle plus some small stock and transport animals	US\$ 150-160 for 300 households	Project for destitute herders
USAID Niger	1-2 cattle	US\$ 75-150 for 200 pilot households	Part of Niger Range and Livestock Project setting up co-ops, credit fund, etc.
UNHCR SE Ethiopia	1 cow, 1 donkey, 2-3 sheep & goats	No data	Re-settle refugee Somalis
LMB NE Ethiopia	2 cows, 2 camels, 12 sheep and 15 goats proposed	US\$ 300 for 5,000 households	Redistribute post-drought livestock population, aid destitute
Oxfam Kenya	50-80 small stock, pack animals domestic equipment and grain	US\$ 1,200-1,300 for 70 households	Pilot for more extensive project in 1985/6

Sources: See footnote 2/ at end of paper.

Choice of scale

33. The aim of reconstitution schemes is largely one of redistributing surviving animals, since they provide the finance for particular groups within the pastoral sector to acquire animals from other livestock owners in the same area or from neighbouring areas. Consideration must be given to the number of people a project is aimed at and the number of animals to be distributed per household. The costs per household of the credit schemes outlined in Table 2 vary greatly from a low of US\$ 75-100 per household to over US\$ 1,200 for an Oxfam project in Kenya. The difference in scale of project can also be seen in the number of animals transferred in each case, the lowest cost schemes involving relatively few stock, such as 1 or 2 cattle and/or several small stock. In such cases, the animals distributed are meant to supplement the income households earn from other sources. The most expensive scheme involved the transfer of 70 to 80 sheep and goats which it was hoped would provide for most of the household's needs.

34. One constraint on the choice of scale is imposed by the total number of affected persons. Where a very large number of herders have been badly hit by drought, a choice must be made between distributing a small number of stock over a large number of households and providing sufficient animals for the complete reconstitution of a few households. Most projects have opted for the former policy, basing their decision on the desire to have an impact, albeit low, on as large a number of households as possible. Those households receiving a few animals must continue to pursue a wide range of income-earning activities, a strategy which will be easier for large extended family groups than for smaller households. A survey of Tin Aicha village in north east Mali, several years after the initial distribution of stock to households, found that those who had built up animal numbers and had prospered were those with sufficient labour, so that some members could be allocated to pasturing animals, some to cultivating the family's field and some to engage in trade. Small households had not found it so easy to look after the distributed stock in addition to farming and as a result their animals had not flourished (AFSC, 1982).

35. The continued pursuit of a variety of activities by the household may be the best means by which to protect overall income from the risks attached to each single sector. There may be a certain price to pay, in terms of lower productivity in each sector, when these activities are combined in the same household enterprise than if they were to be pursued individually. For example,

herders who combine farming with caring for their stock are likely to experience lower levels of crop and animal productivity than if each one had been pursued as a separate activity, unconstrained by the labour demands of the other. However, the benefit of combining these different sources of income may be considerable in terms of reducing the risk to household income from dependence on one source of income alone.

36. Thus, in planning a herd credit project, account must be taken first of the extent to which other income-earning activities are available and could be encouraged to provide a household with a mixed livestock-farming-trade based enterprise. Where such mixed strategies are not possible, or are pursued only at great cost, due to environmental constraints, it may be preferable to provide sufficient animals to create a viable herd for a limited number of households and to help the rest of the population to move and re-establish themselves elsewhere.
37. Two further constraints on choice of scale for a herd credit project are imposed by the availability of stock for distribution and the condition of pastures in the post-drought period. Where all herds have been gravely affected by drought losses, few animals will remain in the local region which are available for purchase and redistribution. However, stock may be available after a lesser drought in the hands both of herders and of other livestock owners, such as farmers or traders. Where stock are bought locally, there is no increase in overall stocking rates, the existing animals being redistributed among producers. The number of stock available locally will determine the level of prices which must be paid. As noted earlier, the prices of livestock in general and of breeding stock in particular are likely to be high in the few years following a drought. Those producers who have been able to carry some of their animals through the drought period will benefit from this post-drought price increase. The setting-up of a herd credit programme will lead to further upward pressure on prices. If there are few animals available for purchase locally, the project must consider the possibility of buying significant numbers of animals from less-affected regions where prices are lower.
38. The advisability of bringing in livestock from outside the region depends greatly both on the suitability of stock from a different area and possibly a different ecological zone and on the speed with which pastures are expected to recover after the drought. Where livestock losses have been very heavy and where

rainfall returns to normal levels in the post-drought period, some pastoral areas will find themselves with insufficient animals to make use of the available grazing. This represents a waste of resources and a loss in potential meat, milk and herd growth of particular significance if livestock are kept under less favourable conditions in other parts of the country. In such circumstances, there would be a strong case for a herd reconstitution programme which involves the movement of animals from more to less crowded areas through a re-stocking scheme, such as that carried out by the Livestock and Meat Board in Ethiopia in the post-1974 period (LMB, 1974). However, movement of stock from one region to another would not be advisable where the effects of a prolonged drought on pastures has been so severe that a few years should be allowed to elapse before encouraging a substantial growth in herd numbers. In addition, animals from outside the region may not be suited to the ecological conditions in the area to be re-stocked.

The institutional framework

39. Consideration should be given to the optimal institutional structure within which to carry out a herd reconstitution programme. First, several writers have emphasized the importance of a close knowledge of the community which it is intended to aid. They argue that projects should aim to support local strategies for adapting to harsh climatic conditions and periodic drought (Harmsworth, 1984). Turton and Turton (1984, p. 178) note that one must not overlook "those qualities of resilience, technical sophistication, inventiveness and sheer human determination [of the community to be aided] to survive which must be tapped, rather than ignored, if intervention in their affairs is to be anything other than counterproductive".
40. Second, the overall structure within which livestock production takes place needs to be considered in order to identify existing groups or create new institutions through which herder credit can be channelled. Four of the schemes for herd reconstitution in the Sahel formed part of a wider project aimed at building up co-operative structures in pastoral areas. These herder co-ops are hoped to provide not only a channel for current development work but, more importantly, a framework within which producers can generate initiatives and guide future interventions by governments and external agencies.
41. Third, the advantage of giving credit in the form of cash or in livestock should be investigated. Cash has the advantage that the herder can then choose the

stock he wants, rather than having to accept those bought by others. As was noted for the Tin Aicha scheme in north-east Mali, project staff made several mistakes in the choice of animal species bought (sheep and cattle had been purchased rather than hardier goats) and in the particular beasts purchased (AFSC, 1982). Some animals were sterile females and others were so young that they could not be expected to calve for two or more years. These mistakes would have been reduced had the recipients been involved in stock-buying as they are likely to have greater experience in recognising the qualities of animals suited to their ecological area. The disadvantage of giving cash for herders to buy their own animals is the possibility of fraud, with recipients using the money for some other purpose. However, the risk of this can probably be kept fairly low by requiring that all animals be brought for inspection and marking them after purchase.

42. Fourth, all herd reconstitution projects face the problem of which households to select as recipients of stock. The target group is likely to be composed of those households who have lost most if not all of their animals but who have access to sufficient labour and skills to be able to care for the animals received. In two of the Sahelian schemes, the recipients were totally destitute herders who had remained in famine relief camps after the end of the drought and who had no resources, apart from their labour with which to re-establish themselves. In other cases, it is less clear from the project literature how those gaining credit were actually chosen. There is always the risk that those with economic and political power will be able to divert resources from such a project to their own benefit, so that the project does not in fact reach the smaller herd-owner for whom it was originally intended.
43. Fifth, the choice must be made between distributing stock on credit or as a gift. Where herd reconstitution forms part of a wider programme, the development of a credit scheme serves the purpose of establishing a revolving fund potentially available for other uses and may help develop the managerial skills required in the development of a co-operative. Some writers argue that gifts destroy a people's self-reliance and should therefore be avoided. Others note that the gift of food or cash may be the best way of helping a society cope with a temporary inability to feed itself. If loans are to be used, the length of time and terms of repayment must be specified. A very short repayment period obliges the recipient to repay before the animals have had much chance to grow in numbers. Too long a period deprives other potential

recipients of the chance of a loan, where a revolving credit fund is in operation. Thus, Marty (1975) recommends a 3-year loan period in the case of small stock, given their rapid rates of reproduction while a longer period of 4 to 6 years would be necessary for cattle and other large stock. The traditional "habbanaae" system of animal loans among the Wodaabe of West Africa works on the basis of the number of offspring produced whilst in the recipient's care, rather than there being a fixed number of years for the loan. Under these loans, a cow is lent for the period required for her to calve three times before being returned to her owner, the borrowing household keeping the three calves. The advantage of "habbanaae" loans is that repayment takes place only once the recipient has gained replacement animals. Where credit is to be used account must be taken of repayment obligations in the event of livestock losses. Recurrent drought or an epidemic outbreak may make it impossible for recipients to repay and debts may need to be cancelled under those circumstances. Action to be taken in the event of occasional animal losses is less clear; some schemes have demanded that the loan be repaid regardless of loss, whereas other cancel the debt. The free distribution of animals to households, in place of a system of loans, has the advantage of incurring zero costs associated with collection of debts. Where administrative skills are scarce and where repayments are likely to run into numerous difficulties, due for example to a high risk of drought losses in the future, the option of outright gifts of stock should be very seriously considered.

Alternatives to herd reconstitution

44. In the face of heavy livestock losses and the resulting impoverishment of pastoral areas and groups, there are a number of options which governments and outside agencies can pursue. One alternative is to take no action, leaving the affected population to their own devices or continuing to provide famine relief to the destitute. The provision of food relief at a basic 0.5 kgs of grain per adult per day implies a total of 900-1,000 kgs of grain per year for a household of 7 people, containing 5 adult equivalents. The cost of providing this grain ration depends on the price of grain, the size of transport costs and on who pays the bill. For example, grain provided free to a particular government for distribution as food aid will cost the government little or nothing, depending on who is responsible for its transport and distribution within the country. By contrast, grain which must be bought on the world market will be much more expensive and will cost the government dear in foreign exchange and transport charges. The price of grain used in this paper is US\$300-400 per ton. i.e. to cover

the cost either of buying local grains or of buying world market grain plus transport costs to local markets. The latter are often as high as US\$150-200 per ton for landlocked states with poor road networks (FAO, 1985). A year's supply of grain to support an average household thus costs US\$300-400, which may be compared with the range of from US\$75-100 to more than US\$1,200 per household for herd reconstitution projects. The cost per household for the most expensive reconstitution project thus represents the most basic grain ration over a period of 3 to 4 years.

45. A second alternative lies in the development of other income-generating activities for drought-affected groups. Given the aridity of many of the areas concerned, proposed alternatives have usually involved some form of irrigated agriculture, although a variety of other options have also been suggested, such as the re-settlement of herders elsewhere or the establishment of industries making use of local resources. Irrigated agriculture has long been considered an obvious solution to providing a livelihood for those living in semi-arid regions. However, irrigation schemes in sub-Saharan African have not been an unparalleled success due to severe technical problems and very high capital and maintenance costs. For example, the capital costs of irrigated agricultural settlement schemes in northern Kenya are put at between US\$17,000 and US\$ 60,000 per hectare (Hogg, 1985), with running costs often exceeding the expected value of annual output. Such large figures imply a capital cost alone of establishing a household in irrigated agriculture of between US\$ 9,000 and US\$ 20,000, a sum far in excess of the re-stocking alternative taken up by Oxfam in Kenya costing US\$1,200 per household. Two of the schemes in north-east Mali included a component for small-scale crop irrigation using very simple techniques and costing relatively little. While these provide a supplementary source of food, they are insufficient to cater for the family's total food needs. However, a number of agencies are now investigating the potential for developing small-scale water-harvesting techniques in semi-arid areas and this option may provide greater prospects for supporting an impoverished pastoral population in the future.

46. Re-settlement of herders elsewhere is put forward by many writers as the only long-term solution for the pastoral zone, given rising human populations, high risks of drought and livestock loss and a declining resource base (Perrier, 1985). Movement by the poorest members of pastoral society into agriculture has been taking place in the absence of government intervention over many

centuries, as work among the Basseri of South Persia (Barth, 1961), among the Oromo of southern Ethiopia (Legesse, 1973) and north African pastoral groups (Johnson, 1973) has shown. Turton and Turton (1984, p. 189) document the spontaneous settlement in farming of one-fifth of the Mursi population of south-west Ethiopia following the droughts of the 1970s and contrast the success of this settlement with "the widespread failure of externally organised agricultural settlement schemes for pastoral nomads in Africa". They go on to point out that "it may be that the only sensible role for outside authorities in the settlement of pastoral nomads is that of facilitating local initiatives, on the assumption that the only successful settlement schemes will be those ... which have been initiated by the settlers themselves".

47. An alternative to the settlement of pastoralists, either in irrigated agriculture or in dryland farming in higher rainfall zones, lies in the development of income-earning activities based on locally available resources. The extent to which viable alternatives to livestock production can be set up depends on the resources available and the cost of exploiting them. The development of natural resources in pastoral areas has rarely benefited the herding community. Indeed, in several cases, resource development has reduced the viability of the pastoral system, as when game parks have been carved out of a herding group's territory. Some projects, such as the fishery project on Lake Turkana in northern Kenya, were established with the explicit aim of providing those who had lost their livestock with another source of income. However, this does not seem to have provided a promising alternative to pastoralism for the Turkana (Hogg, 1985). Further options that have been considered, such as leather and horn craft-work, provide at best a means to supplement incomes but are not likely to enable many people to support themselves solely on the proceeds from these alternative activities.
48. Thus, it can be seen from the above discussion of herd credit projects that the scale of the programme must take into account the extent to which households can successfully combine the care of stock with other activities. This will differ from one pastoral area to another, as will the availability of suitable animals for re-stocking in the post-drought period. Re-stocking is an obvious programme to pursue where the post-drought distribution of livestock is very uneven and does not make effective use of large areas of available pasture. Participation of the recipient community in planning and implementing the credit scheme may have important advantages in the short-term by reducing administrative costs and in the long-term by consolidating the role that existing

indigenous or new institutions can play in channelling resources and ideas. The choice between livestock loans and gifts should be made on various grounds and should include the relative cost of administering the collection of repayments and what should be done in case of deaths among distributed stock. The costs of herd reconstitution programmes are equivalent at most to providing a basic grain ration to the household over 3 to 4 years. They are substantially lower than the costs of establishing pastoralists in major irrigation settlement schemes. Alternative income-earning options should also be considered, such as small-scale irrigated agriculture and craft production.

Conclusions and policy implications

49. This paper has discussed a range of general policy measures aimed at rehabilitation of the livestock sector following drought. It has also looked at the provision of credit for herd reconstitution and the issues raised by projects that have been carried out in this area. It has been seen that there are a variety of policy measures open to decision-makers concerned with re-establishing some aspect of livestock production. Policies differ with respect to their costs, their welfare implications and the size of their spill-over effects into other sectors of the economy. Out of the range of policy alternatives, decision-makers will face a more restricted choice determined by the conditions faced in the post-drought period, in terms of the resources available domestically (pastures, livestock, supplementary fodder), the local administrative capacity and the country's marketing and transport infrastructure. External finance can help to loosen certain constraints, as for example when governments can supplement local food supplies with aid in the form of grain and milk powder.
50. In considering the best means to aid the pastoral sector, decision-makers should consider as many policy options as possible, since the conditions faced by different regions and producer groups in the post-drought period will vary greatly. The various policy options should also be assessed in relation to the alternative strategy in which no action is taken.
51. Policies for rehabilitation of local production systems need to be considered in relation to short-term relief measures and long-term policies for establishing less drought-vulnerable systems of production. The speedy provision of relief food supplies to producers in greatest distress would reduce the subsequent need for rehabilitation measures. For example, if herders can get access to

relief grain supplies, they will be under less pressure to liquidate their livestock capital at very low prices in order to buy food for themselves. Policies for rehabilitation should also be formulated in co-ordination with longer term development measures, since the post drought period can provide a breathing-space during which to initiate changes in patterns of production and resource management. Rehabilitation should not necessarily be taken to mean the re-establishment of production systems along the exact lines of those existing in the pre-drought period.

52. Non-governmental organisations (NGOs) have played a valuable role in developing small-scale projects suited to the conditions and problems of particular drought-affected communities. This is especially the case for the Sahel, where a number of innovative herd reconstitution schemes have been set up since 1973. The experience of these schemes provides other agencies with possible models for intervention. However, it should be recognised that the relative success of much NGO work depends on its small-scale operation. Large-scale herd credit programmes will face greater problems from a shortage of animals available for re-distribution and consequently higher prices.
53. Decision-makers in both government and development agencies are faced with a shortage of resources and a wide range of possible uses for funds. Following a period of drought, the conflict between alternative uses of funds is likely to be particularly acute, given a shortfall in supplies of meat, milk, grain and foreign exchange earnings. Choices must be made between the achievement of different policy aims, especially where these are themselves in conflict. Examples of such conflicting aims are given below.
54. Satisfying domestic vs. export markets. While political considerations might encourage the diversion of meat and fodder supplies from export markets to domestic consumers, account must also be taken of the consequent possible loss of export markets to alternative sources of supply. The Ivory Coast, for example, now gets a substantial proportion of its meat supplies from non-African sources, having formerly depended almost entirely on imports of Sahelian livestock. This switch in the source of meat imports occurred following the 1968-73 drought, when supplies of meat from the Sahel were scarce and highly priced. Meat exporting countries like Mali now face a much weaker position in the Ivory Coast meat market since there is strong price competition from other meat exporters such as Argentina with whom trading links have now been established.

55. Use of male cattle for meat vs. draft purposes. Where oxen are an important input into crop production, some competition will exist between the use of male cattle for meat (by their fattening and early slaughter) and their being used for draft animals. The relative strength of demand from each sector will depend on the incomes and purchasing power of domestic and foreign consumers of meat and of the investment funds available to farmers. Where drought losses of work oxen have been high, farmers' ability to reconstitute their work-oxen holdings will be made more difficult if they face strong price competition from consumers of meat. In such a case, the government may need to intervene in order to achieve the desired balance between satisfying immediate demands for meat with the requirements for rehabilitating the productive capital of the farming sector.

56. The allocation of resources: aid to the farm sector vs aid to the livestock sector. In a number of areas, decision-makers are likely to be faced by policy choices which either favour the rehabilitation of farm production or benefit livestock producers. For example, the government can choose to subsidise the distribution of animal feed either to owners of work-oxen or to pastoral herders. The re-establishment of grain production is arguably more important to the national economy than the reconstitution of pastoral herds, due to the importance of grain in the diet of all consumers and of the poorest groups in particular. Once harvests are back to normal levels, pastoralists are also likely to benefit as increased grain supplies and lower grain prices will reduce the pressure on herders' incomes and thereby reduce the number of animals needed to constitute a viable herd. On the other hand, it can be argued that livestock production is the only effective means of using the resources of certain semi-arid areas. Grazing animals alone can convert the sparse natural vegetation into valuable products for the rest of the economy and can provide support for a proportion of the human population. Pastures which are not grazed constitute a waste of resources, a loss which can be reckoned in foregone milk and meat output. The overall balance in the distribution of resources between the farm and pastoral sectors should consider these arguments.

FOOTNOTES

1/ Toulmin (1985) discusses the above two points in greater detail, particularly those aspects which concern the farming (crop) sector in terms of the effects of drought on and the rehabilitation of this sector. While the livestock/crop interaction is an important and often inseparable activity, it is only for the purpose of keeping the article reasonably short that discussion is concentrated on the pastoral livestock sector. Another article dealing with the consequences for the farming sector is planned to be produced in a forthcoming ALPAN issue.

2/ Sources for Table 2

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