
Paper 18: Beneficiary reactions to the fodder bank trials

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Abstract

The fodder bank was designed by ILCA to ease the livestock feed shortage during the dry season that occurs in the subhumid zone. A land area of about 4 ha is cleared, fenced, prepared and sown with a legume which is then grazed by selected animals in the herd during the dry season. The initial on-farm trials produced a variety of reactions from the cooperating Fulani. Closer documentation of Fulani behaviour was undertaken to appreciate these responses, which are summarized in this paper.

Not surprisingly, Fulani perceptions of expected costs and benefits were principal considerations in their decisions to test a fodder bank. Costs include the necessary inputs, land and labour, while the primary benefit is a protected dry-season grazing resource. The prerequisite is available, secure land.

Once the Fulani decide to test a fodder bank, then, a variety of factors influence the extent to which they follow the research recommendations. These factors include individual production objectives and management strategies, herd ownership patterns, household resources and competing demands on those resources, seasonal labour priorities, and dry-season grazing conditions. The multiple purposes cattle serve in the Fulani system and the multiple ownership of herds add complexity to the intended utilization of fodder banks in the dry season.

Over the 5-year experience with fodder banks, feedback from pastoralists has led to component research and modifications in the research recommendations. Initially ILCA-funded and managed, fodder banks are now Fulani-funded and managed.

Introduction

Recognizing that the producers subjective assessment of a technology is the critical determinant of adoption, ILCA has sought Fulani feedback to its fodder bank trials. The interaction between fodder bank and pastoralist is dynamic; assessments vary from one

period to another and from one pastoralist to another.

This paper outlines some of the social and economic issues involved in fodder bank adoption, based on information gained from pastoralists in the ILCA case study areas. ILCA has been testing the fodder bank with Fulani since 1980. Ensuring producer feedback provides the research team with the basis for improving the design of the technology.

The sample of fodder banks

By the end of 1983, the number of established fodder banks had risen to 20 in the three areas of Kurmin Biri, Abet and Kachia. Kurmin Biri and Abet had high ILCA and/or government involvement, and the Fulani had expectations based on previous incentives and exposure. In contrast to Abet and Kurmin Biri, Kachia represents a site of spontaneous uptake. Over the 5 years of fodder bank research, responsibility for investment costs has gradually been transferred to the owners. At the outset ILCA met all the establishment costs (except land), but now the pastoralists incur all costs. Credit is extended by NLP. Management advice is given by NLP and ILCA.

It is too early yet to determine the rate of adoption or identify the likely group of adopters. Notwithstanding, some relevant socio-economic indicators for the research sample of 20 fodder bank participants are presented in Table 1.

Table 1. Socio-economic indicators of participants in ILCA's fodder bank programme.^{a/}

Indicator	Average	Range	Responses
Herd/flock sizes ^{b/}			
No. cattle/household	60	30-124	
No. sheep/household	9	0-31	
Farm size (ha/household) ^{c/}	1.1	0.23-2.19	
Household size ^{b/}	14	8-22	
Active males/household ^{b/ d/}	5	2-8	
Age of household head	48	28-75	
Off-farm income			
Yes			9
No			9
Literacy (household head)			
Arabic			4
Hausa + Arabic			4
Hausa + English			1
Hausa + Arabic + English			1
None			8

^{a/} n = 18 Fulani households.

^{b/} n = 17 households; excludes 1 household with 700 head of cattle and 30 sheep in the household because atypical of sample.

^{c/} n = 10 farms measured; all these Fulani are farmers except 1; 2 others practice farming very minimally.

^{d/} Active males above 6 years old indicates potential labour for herding, farming and cattle management, although actually they may be involved in schooling or off-farm employment.

All of the current fodder bank participants in the three locations are Kachichere Fulani. They have been resident in the general area of their current settlement site for a considerable period, and may be considered settled Fulani, but this is a relative term since they may periodically move their rugas (homesteads) over a limited distance or, more often, transfer part of their herd at various times of the year to exploit seasonal grazing possibilities. The length of continuous settlement at the current site ranges from 1 to 12 years. Three of the fodder bank participants, all in the Kachia area, have purchased usufructory rights to their land. They are all pastoralists, but their sources and levels of income, standards of living and direct involvement in cattle management vary considerably. In general, their production objective is to increase or at least maintain their herd size, and their cattle serve multiple functions in the social and economic order.

Initial decisions to test a fodder bank

Multiple interviews with the fodder bank participants (n=20), as well as with 35 other pastoralists who have seen fodder banks but have not yet expressed an interest in testing one, revealed four central and interrelated factors influencing decisions. These factors are land availability, perceived costs, perceived benefits, and personal motivation.

Land

The availability of land is a prerequisite for interest and willingness to invest in a fodder bank. [Land availability depends on locational factors such as the land tenure system, fragmentation of holdings, opportunity cost of land, and individual farmer - Fulani relations. The Fulani's reasons for settling and the intended nature of the settlement - permanent or temporary - affect their attitude towards investment in land development.

The three areas where fodder banks have been established represent differing land situation and settlement rationales. In Kurmin Biri, Fulani have purposefully settled on the grazing reserve in the expectation of secure and permanent land rights for cropping and grazing. In Kachia, there is unexploited land available for sale. Three of the four fodder bank participants in Kachia have purchased land through the District Head. Reportedly, other Fulani are now in the same process. The Fulani consider such land purchases necessary in order to guarantee occupancy and to provide the legal basis for security against troublesome farmers.

Abet, in contrast, is an area of relatively high population and cultivation density where the indigenous Kaje and Kamantan farming groups claim competing rights for settlement and cropping. In 1983 and 1984, farmer-Fulani conflicts made it impossible for interested fodder bank participants to acquire the necessary land. Only two Fulani in the Abet area, both fodder bank testers, have more secure land agreements. In one case, the Fulani was granted a gift (kyauta) of unused land which implied inheritance rights; in the other, the Fulani has a witness paper signed by the village head signifying occupancy for as long as the Fulani wishes. In 1984, for the first time, farmland was purchased; the buyer was a Fulani.

Only 3 of the 20 participants do not have some form of relatively secure right to land and intended permanence of settlement, through either living on the grazing reserve, purchased usufructory rights or locally negotiated transactions. Two of the three were ILCA enlisted participants. The other Fulani was self-enlisted but had left his site and the fodder bank after 1 year. Secure land rights and permanent settlement appear to be essential prerequisites to adoption. In general, the Fulani response is that unless they 'own' land or use unexploited land which is unlikely to be reclaimed by farmers, they cannot have a fodder bank. Besides security in title, the land area must be large enough to support a fodder bank. The exact size of the fodder bank depends upon land available and the opportunity cost of the land.

The fodder bank might be viewed by Fulani as a means of gaining land rights. This does not appear to be the case. Use of marginal land for fodder bank development without securing rights first is inhibited by two factors. Encroachment by farmers has made many pastoralists unwilling to invest in marginal land. Also, the use of such land depends upon its suitability as a site for family compound, cattle corral, and for subsistence cropping: people, cattle and crops go together.

Costs

Fencing is essential to control grazing, but it is a major expense and acts as a key deterrent to fodder bank establishment, not only in terms of capital outlay but also because it formalizes the use of a given land area. Fulani prefer metal posts, but these add to the cost. A few Fulani have used local materials, such as termite-resistant wooden posts or cuttings from indigenous trees that root when buried to become live fence posts. Such indigenous fencing materials provide lower cost alternatives.

Other costs to be considered include the initial labour requirements for land clearing if necessary, fence erection, fencing materials (when locally made) and firebreak creation, recurring costs of reseeding and maintenance and any opportunity costs such as land, family labour and use of animals in seedbed preparation versus manuring cropland. It is not clear yet how such costs will affect adoption.

Benefits

The expected value of the return from the fodder bank depends upon a variety of interrelated factors. These include perceptions about the severity of the dry-season grazing problem, size of the fodder bank in relation to herd size, and the degree of uncertainty about the expected benefits. A major benefit is the fencing, which protects the area from communal grazing.

Kurmin Biri is thought by the Fulani to have a more severe dry season than other locations: the dry season is longer; there are fewer crop residues to graze; riverine grazing is inaccessible due to dry-season farming; natural grasses are said to be of lower quality than in more densely cultivated areas; the fact that the bush is a vast open area results in uncontrolled burning depleting valuable bulk. One would expect the Fulani in such areas to be predisposed towards the establishment of fodder banks.

Dry-season grazing resources are more plentiful in Abet, consisting of crop residues and low-lying (*fadama*) grazing sites. Although the nomadic Bororo bring their herds into Abet during the dry season, which means competition for these resources, the Fulani generally do not consider the dry season to be as severe in Abet as it is elsewhere. Thus there is less motive to incur the cost of a fodder bank, since an additional grazing resource is less necessary.

Depending upon the individual Fulani's herd size and management strategy, the fodder bank's size becomes a factor influencing adoption. For Fulani with small herds, who split their herds in the dry season or who expect the fodder bank to feed only a limited number of animals, size is not a problem. Many Fulani, however, view the costs of establishment as too high for a limited grazing area that cannot adequately feed their whole herd.

In the short term the Fulani expect to see an immediate and visible gain from the fodder bank in terms of improved animal condition. In a few cases, this benefit has been observed, but in most it has not- either by participants or by onlookers. The uncertainty of any benefit and the time lag before the fodder bank results in visible cattle improvement are negatively influencing Fulani interest at this intervention testing stage of the LSR cycle.

Motivation

Various ulterior motives influenced decisions to establish fodder banks. They include:

- The expectation that the research programme will allow them access to veterinary services, future government loans or anything else that the Fulani need, including fertilizer and supplementary feeds.
- The belief that government assistance with free inputs would not continue or land would become unavailable.
- The desire to be seen by other Fulani as a government collaborator and an innovator.

Until a profitable return is proved, it is likely that such motives will outweigh genuine interest in fodder banks.

Depending on motivation, the commitment to fodder bank investments obviously varies. When their interest was not self-initiated and/or the motive was not genuine interest, the Fulani have been largely unwilling to shoulder the establishment and maintenance costs and tasks. This unwillingness was particularly evident for participants in Kurmin Biri. They have settled on the grazing reserve largely expecting the government to provide services; administrators, in turn, have made various promises. Together, these factors have resulted in a generally low level of personal commitment.

Fulani feedback on fodder bank establishment

From the sample of 20 fodder bank testers, data were collected to determine to what degree Fulani followed the recommendations; what were the deviations and why.

Land clearing and fencing

Land clearing is considered strenuous work and is often hired out. The labour costs of land clearing depend on the amount of bush and tree cover. The objective is therefore to use land that is already fairly clear, but this depends on what is available. In areas where Fulani do not have secure land rights, the use of fallow land for long-term investment is considered untenable by the Fulani since farmers are certain to reclaim the land. Unexploited land is viewed as the only choice for fodder bank establishment; but such land is likely to be heavily covered with trees, bushes and grasses, and hence more costly to clear.

Likewise, erecting a fence round a 4-ha area involves considerable labour. There is no previous experience with setting fence posts and stringing barbed wire into a tight, secure fence.

Consequently, ILCA or NLPU have largely done both the clearing and the fencing to date. It is difficult to ascertain how much of a constraint the costs or labour involved in these tasks will be, and their effect on adoption rates across economic classes remains as yet unknown.

Seedbed preparation

Trampling by cattle during overnight corralling to prepare a seedbed has proved ineffective and unacceptable in many cases. These Fulani have long experience with confining cattle overnight to prepare cropland and deposit manure. Consequently, they have considerable ethnoscience relating to the practices and benefits of using cattle to prepare cropland. Fulani use their herds to manure cropland in the early rainy season, so there is competition between preparing the fodder bank and plots for subsistence crops. In the dry season in areas like Abet, Fulani are paid by farmers to corral their cattle overnight on farmers' land. Also, the Fulani traditionally prepare iburu (Digitaria iburea) and rice seedbeds by confining cattle

overnight on the site.

The technique is effective because the Fulani distinguish carefully between land types, soil quality (primarily in terms of water retention and compaction) type and quantity of the vegetative cover, size of the herd to be used timing in the rainy season when confinement is done and the subsequent effect on grain and natural vegetative yields. Efficiency of trampling is a function of herd size and the length of the trampling period. The area that can be trampled in any 1 year is generally considered too limited. Using animals during the dry season to graze down the area and deposit manure merely increased grass competition. In response to these problems, ILCA has carried out component research on seedbed preparation methods. Initial results suggest that a brief trampling period after seeding will be acceptable to producers (Paper 16).

Grazing of weeds

The Fulani rightly consider weed competition a major inhibitor of stylo germination and growth. However, they have been unwilling to use their herds to graze down competing grass growth. They fear the disease threat inherent in recently manured areas, and claim that animals refuse to graze where the smell of manure is strong.

The Fulani also observe that their animals are not selective, eating the stylo together with the grasses and thus depleting the valuable stylo. In addition they believe that trampling, which occurs during grazing, damages stylo seedlings. In 1984, two Fulani adopted their own wet-season grazing strategy to control grasses. The whole herd was put in for grazing at the start of the early rains in March to control grass competition. When the grasses were considered to be adequately controlled, grazing was stopped (by mid-May). They stated they would not graze further until the dry season. The outcome of this approach will be reviewed at the end of the 1984/85 dry season and compared with existing methods.

Firebreaks

Fulani consider fire a major threat to fodder bank and pasture development. As a result they have been willing to expend labour to create firebreaks, mainly through controlled burning.

Utilization of fulani-managed fodder banks

ILCA recommended dry-season utilization of the fodder bank by lactating and heavily pregnant cows for 2 to 3 hours per day. This recommendation was intended to provide supplementary protein at the time of greatest need to the classes of stock most able to respond profitably. The response was expected to be increased milk production (for human offtake and calf consumption), and improved calf survival and growth rate. This management strategy was thought to be consistent with the objectives of the Fulani as regards herd size, milk offtake and animal sales. It was also thought to be consistent with national objectives of increased milk and beef production (von Kaufmann and Otchere, 1982).

In January 1984, ILCA recommended a stocking rate of about 15 animals for each of the 11 fodder banks that had established well enough to implement a grazing regime. Pastoralists participated in the animal selection process. Despite this recommendation, in most cases whole herds were given access to fodder banks--either the total herd ranging from 30 to 120 animals, or that part of the herd that remained at the ruga (encampment) when other animals were transferred elsewhere, ranging from 16 to 61 animals.

The feeding strategy observed among fodder bank participants indicates that their objective is to ensure the well-being of all animals within the herd during the dry season. If a given feed resource is limited in availability and/or costly to obtain, such as cottonseed cake, then

selective feeding may occur, but out of necessity rather than choice. The behaviour of participants is related to two central factors: the multiple objectives of Fulani cattle husbandry, and multiple herd ownership.

Multiple objective system

For the Kachichere Fulani female animals are the most valued asset because of the calves and milk they produce. But all animals in the herd are productive and have a purpose; otherwise they are sold or exchanged. Feeding only a few is viewed as irrational because all animals are needed for family subsistence, whether they provide milk for the calf, for the family, or for the wives to sell; or capital to purchase grain and consumer goods or to pay school fees; or a means of meeting social and cultural obligations (van Raay, 1975).

Cattle are both a means to an end and an end in themselves (van Raay, 1975). They provide the basis for family subsistence as well as being a way of life. Animals that can be accumulated beyond the perceived needs of the household serve as an investment and an insurance against times of adversity, as well as bringing prestige and a means of helping others.

Multiple ownership

Individual animals may be owned by wives, children and relatives, or entrusted to them by non-kin owners. Major management decisions are not made in isolation, nor by one individual. Weak or sick animals receive special treatment regardless of ownership, but for the rest multiple ownership implies multiple decision makers. Multiple decision-making adds complexity as well as encouraging the tendency to treat all animals equally.

The result of these two factors is that Fulani generally employ a maintenance or survival feeding strategy in which animal condition determines feeding practices. As the quantity and quality of natural resources decline over the dry season, even a limited feed resource, such as the fodder bank, is made available to all animals.

Interviews with a random sample of 38 Fulani indicate that on average three to five animals per herd either die or must be sold/culled in extremis due to the dry-season grazing constraint (Table 2). Fulani distinguished between diseased animals and animal losses from weakness due to dry-season conditions. Maintenance or survival feeding means being able to sell an animal when desired - i.e. when in good condition, when sale prices are high, or when the owner needs cash - rather than when forced to do so by external events--such as in the case of emergency sales in the late dry season, when the animal is emaciated and market prices are low. The advantage of fodder banks from the Fulani point of view lies in their ability to maintain animal condition and/or herd viability. Future component research by ILCA on the effects of fodder bank grazing on herd productivity will therefore include the feeding of weak animals. ILCA and extension staff will also ensure that all such animals are selected for intervention testing.

Table 2. Animal losses in the dry season, Kurmin Biri and Abet, 1982/83 and 1983/84.

Variable	1982/83		1983/84	
	Kurmin Biri ^{a/}	Abet ^{b/}	Kurmin Biri ^{a/}	Abet ^{b/}
No. of herds which lost animals	6	18	8	16
% of herds which lost animals	46	72	62	64
Total number of animals lost	24	63	40	45
Average loss per herd (head)	4	3.5	5	2.8

^{a/} n = 13.

b/ n = 25.

Given the longer dry season, more losses were expected for 1983/84 than for 1982/83. This was the case for Kurmin Biri but not for Abet, where the rains started in early March in 1984. Early rains bring new green grass growth and a last chance to avoid animal losses.

Other factors influencing fodder bank utilization

Labour

Separating animals and managing two groups of cattle, one in the fodder bank and the other not, require additional labour inputs. While young children may be responsible for the non-fodder bank group, it takes a fairly skilled, older person to separate out the selected animals and move them onto the fodder bank. If either the skilled herder or the children were lacking, then the fodder bank group could not be handled separately.

Fencing

In three cases, fencing around the fodder tanks was insecure, so that controlled grazing was impossible even if it had been intended.

Animal selection

The Fulani had their own ideas about which animals should be included in fodder bank grazing well before ILCA came to solicit their participation. They claim that they did not participate adequately in the animal selection process. Rather, they suggest that IT CA selected certain lactating and pregnant cows; they privately agreed or disagreed and followed the recommendations or not accordingly.

Forage quantity and quality within the fodder bank

Using their knowledge of the effects of different legumes and grasses on animal condition, the Fulani evaluated the quantity and quality of fodder on the bank and decided how to use it. Their decisions often changed as the dry season progressed.

The Fulani recognize stylo as a quality forage which can benefit weak animals, increase milk production and/or raise herd fertility. In some cases, Fulani felt that their fodder banks had sufficient forage to support more animals than selected by ILCA. On the other hand, when the proportion of stylo in the fodder bank was too low or had been used up, the Fulani viewed the bank as merely a bulk reserve. They did not feel that it was worth the effort to prevent some animals from grazing.

Grazing time

All of the Fulani chose to use their fodder banks in the morning rather than the evening. It is easier to separate animals at the time of milking, done exclusively in the morning, than in the evening when cattle are returning from grazing. Also, grazing the fodder bank in the morning fitted into the traditional grazing routine practised in the dry season. Because feed resources are so limited, grazing begins very early in the morning, such that the grazing day is divided between two graziers, the first of which is responsible for a 3-hour early morning period before the second takes the herd further afield for the rest of the day. In response, ILCA has agreed to monitor animal productivity under a morning grazing regime.

Daily management

The Fulani developed an alternative form of rationing by restricting the frequency of fodder

bank grazing. Depending on their estimates of the quantity of forage available on the fodder bank, most did not use the bank daily. One Fulani deferred grazing of his fodder bank in mid-February for 2 weeks in order to hold the forage for later grazing. Also, fodder bank grazing did not occur on days when the traditional mineral supplement kanwa was fed, because kanwa feeding took place during the hours usually spent in morning grazing.

Management response to differing dry-season conditions

The difference between Abet/Kachia and Kurmin Biri in terms of the length and severity of the dry season resulted in different decisions concerning the use of fodder banks. Both Abet and Kachia had rains early in March 1984, so that a nutritious alternative in the form of new green grass was available, allowing fodder bank grazing to end. The first rains in Kurmin Biri, in contrast, did not come until the end of April (6 weeks later), such that cattle there spent about 2 months with very minimal feed. By the end of the dry season whole herds were still using the fodder banks, licking debris from the ground throughout April. Also, in Kurmin Biri two Fulani began night grazing of their fodder banks. This was an important development, since these Fulani do not normally practice night grazing.

Period of use

The overall consensus among the Fulani was that fodder banks are best reserved for later dry-season grazing. This may have been a reaction to the severity of the 1984 dry season, but two main reasons were given: (a) because of the fence, the fodder bank can be reserved until late in the dry season when little other forage is available and animals are under the most stress; (b) animals that graze the fodder bank during the early dry season will still lose condition once the stylo is depleted. The advantage of a quality diet in the early dry season, such as obtained through crop residue grazing, is considered by the Fulani only to be realized if the animals continue to obtain a reasonable diet throughout the dry season. Therefore, the strategy would be to pursue natural grazing until it is depleted and then move to the fodder banks in order to have a steady intake.

Herd splitting during the dry season

While the Kachichere Fulani are 'settled', they maintain many of the same flexible grazing strategies as the more mobile groups. The major difference is that they confine their grazing to within a 30- to 50-km radius of the ruga. Cattle transfers during the dry season thus determine which animals are available, and/or the timing of fodder bank grazing. Apart from the desire to exploit grass growth caused by early rains in adjacent districts, there are three other types of animal transfer that may affect utilization:

1. Dry-season transfers. Usually the herd is split and part of it moved to another area for the entire dry season in order to distribute stocking pressure or to take advantage of better feed resources elsewhere.
2. Crop residue transfers. Whole herds may be temporarily moved away from the ruga in order to exploit crop residue resources in nearby farming areas.
3. Transfers for manuring contracts. Where Fulani gain cash or other assets in exchange for manuring farmers' fields during the dry season, whole herds may be moved some distance away from the ruga to spend nights on farmers' fields.

Conclusions

Although most of the Fulani expressed dissatisfaction with their fodder banks in terms of not having enough stylo or not being large enough, all were very interested in them. The expected return is sufficient to maintain interest. The Fulani say that fodder bank grazing maintains

strength so that animals do not become so weak that they cannot stand without support and have to be culled from the herd. They also recognize that fodder banks make concentrate purchases less necessary and can feed more animals than concentrates, the supply of which is too scarce, costly and unreliable.

Fulani consider dry-season nutritional constraints a major problem in cattle production. Any effort to alleviate this problem is regarded with interest, especially in locations with particularly poor dry-season grazing, such as Kurmin Biri.

Suggestions for further research

Maintaining animal condition is the most critical concern of the Fulani, not increased productivity per se. The value attached to a live animal in the herd is very high and, if there has to be a choice, it is more reasonable to save as many animals as possible during the dry season rather than aim for increased productivity in a few. Productivity changes that are unrelated to herd maintenance are unlikely to command attention under current management practices.

Given the variation in management strategies even within a particular production system, a range of utilization options (stocking rate, length of grazing period, etc) is probably needed. The range should be based on:

1. Producer objectives
2. Labour availability
3. Expected length and severity of the dry season
4. Availability of alternative dry-season grazing resources
5. Stylo and grass composition on the individual fodder bank
6. Size of herd resident at ruga during the dry season.

The expected benefits for the various options could be projected. Considerable research is required to determine the effect of alternate options on herd productivity.

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