CATTLE AND CRIBS:
GRAIN STORAGE AND PRODUCTION AMONGST PASTORALISTS IN ETHIOPIA AND NIGERIA

Mick Blowfield and Tim Donaldson

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INTRODUCTION

Grain consumption is a fact of life for many African pastoralists. This is not an original insight, but it is an increasingly important one as we become more aware of the interaction between pastoralism and cultivation throughout Africa. This awareness has partly resulted from seeing the strategies adopted by pastoralists during times of drought. Drought reduces milk yields, causes the quality of cattle to decline and leads to low cattle prices as pastoralists sell off cattle to meet basic needs. If no other options are open, this can lead to asset stripping with herds being reduced to unsustainable levels.

Cereal banks have been tried in several areas in response to market failures that cause inadequate food security for herders (Fowler and Moorehead 1992). Whether such interventions are ultimately sustainable or more effective than current systems involving cereal traders is open to question (Berg and Kent 1991).

For some pastoral communities cultivation of cereals and other crops offers a valve to release the pressure of environmental stress, provided that harvests can be stored effectively. Appropriate local storage facilities are therefore an important component of food security policy amongst pastoralists. While there are descriptions of pastoralists engaged in cultivation, post-harvest aspects have largely been over-looked.

To illustrate the importance of grain storage amongst some pastoralist groups examples from the Borana in Ethiopia and the FulBe in Nigeria are outlined. These examples exhibit the importance of storage systems to pastoralists in different circumstances but also highlight the view that there are no fixed solutions appropriate for all cases.

STORAGE SYSTEMS FOR THE BORANA, ETHIOPIA

The role of local storage facilities in providing food security for Borana pastoralists was highlighted during a rangelands development project in Sidamo province, Ethiopia[1]. During the mid-eighties, drought forced the Borana to sell livestock at distress prices to buy grain. It was feared that in the longer term many would be forced to leave the pastoralist production

1.This project, implemented by CARE with funding from the Overseas Development Administration (ODA), has been working in the area since 1987.

system and move into settled cultivation or to urban areas without having the necessary skills (Fowler and Moorehead 1992). Strengthening the Borana's position in relation to the cereal market would help alleviate this pressure. Indeed, under balanced market conditions meat and milk can be sold or bartered to obtain cereals with a considerable net gain in calories (Fowler and Moorehead 1992).

The Borana responded to the 1984-1985 drought by building many community stores, using both underground and above-ground designs. The main cereal consumed is maize which is bought loose or, in cases where the Borana cultivate, stored on the cob. Therefore a programme, implemented

Fig. 1: Boran annual terms of trade

by CARE, was started to promote the use of storage systems which would allow the Borana to buy grain when it was cheap and store it for consumption when the terms of trade shifted against pastoralists (see Fig. 1, Donaldson 1991). Underground pits lined with fired clay or cement were promoted but mould losses of up to 16% were recorded (Hodgson 1990). Consequently the Storage Management section of the Natural Resources Institute (NRI) was asked to advise and assist with a system for improved storage design and extension.

Developing storage technology amongst the Borana

Four types of store were tested by CARE and NRI with the Borana:

1. a cement-lined pit already being promoted by CARE;
2. a modified cement-lined pit;
3. a modified clay-lined pit;
4. an above-ground store.

The modifications made were of existing designs and technologies[2] and as far as possible used readily available materials and transferable skills. The stores were supplemented by drying racks, and to help eliminate damp inside the store, pits were lined with ash followed by a layer of dry grass or straw, covered by bamboo matting. A cow dung and ash mixture was used as a sealant, and the entrance was covered with a final layer of ash and mounds of earth.

To reduce infestations of maize weevil (*Sitophilus* spp.) and red rust flour beetle (*Tribolium* spp.), neem (*Azadirachta indica*) leaves were powdered and mixed with the maize. Synthetic insecticides were not readily available in the area and were not included in the treatment.

Workshops on store capacity, construction and sampling protocol were held for CARE personnel assisting in the trial, for masons and trainee masons helping in storage construction, and for extension staff.

Three Borana villages which were already using underground pits were chosen as trial sites. Borana men dug the pits and women bound and thatched above-ground stores. Lining of the pits was done by trainee Borana masons. Once finished, each store was managed by one or two families. CARE bought maize to fill the stores which was then sold to Borana at cost price at the end of the trial. The costs of store construction were recovered from those families interested in taking over the stores after the trial.

2.For detailed diagrams of the designs used and of other local designs, see Donaldson 1991.

Lessons from the Borana

The results of these trials are yet to be published (Donaldson and Fautterknecht 1994, in press) but a number of issues arose during implementation. First, the rapid uptake of stores by the Borana since 1985 shows that there is an interest in grain storage. However, even working closely with community-oriented extension programmes, there are many social and economic aspects that might be overlooked. There are social and economic differences amongst the Borana and these differences will have an impact upon the access to and control over a new technology. Second, local conditions affect the technologies adopted. Stores need to be suited to the climate, but also to the resources available to the community. Loose maize bought at the market, for example, requires different optimal storage conditions from harvested maize stored on the cob. Sparse distribution of markets can increase the amount of grain that needs to be stored and transport of grain is often a problem. The skills and materials needed to build and maintain the stores have to be readily available. Frequent long-distance movement severely limits how much grain can be acquired and stored at one time, and places a high opportunity cost on fixed-place storage systems. Storing for more than immediate needs requires some form of semi-permanent or permanent site which needs to be guarded and maintained. The utility of storage also relates to different coping strategies

Table 1: Coping strategies of pastoralists at times of environmental stress

Condition	Coping Strategy	Implications for Storage
If rains fail ...	Pastoralists move to dry season ranges.	Storage not a key concern.
If no dry season range available ...	Pastoralists consume cultivated crops (purchased or exchanged).	Storage to mitigate deteriorating terms of trade.
If crops unavailable ...	Pastoralists sell small-stock, purchase grain, grow cereals.	Storage to mitigate terms of trade, retain own harvest for later consumption.
If there are no markets or if prices fall too low ...	Pastoralists slaughter smallstock, bleed large-stock, gather more wild foods.	Storage to mitigate terms of trade, storage of wild food.
If food sources are exhausted ...	Pastoralists eat dead animals, gather more wild foods, beg, family members emigrate.	Decentralised storage systems to distribute food, storage of wild food
If above sources are exhausted ...	Pastoralists seek famine relief, wholesale emigration.	Decentralised storage systems for famine relief
If no relief is available and emigration not possible ...	Famine ensues.	Storage systems impracticable.

adopted by pastoralists. For example, storage will be perceived differently by pastoralists who move into cultivation temporarily. Table 1 shows how storage plays a variety of roles.

GRAIN STORAGE AND FULBE PASTORALISTS

The lessons learnt with the Borana were subsequently used in a pilot study with FulBe pastoralists in northern Nigeria.[3] Approximately eleven and a half of the nation's fourteen million cattle are managed by pastoralists (FDLPCS 1992) and with an estimated value of 60 billion naira (FDLPCS

3.The work was conducted in February-March 1993 by a storage technician, a social anthropologist and FulBe specialists in conjunction and consultation with Nigerian government agencies and local NGOs.

1992) pastoralist-managed cattle represent a significant proportion of Nigeria's renewable natural resource.

Cereals have constituted a major part of the FulBe pastoralist diet, at least since the early 1800s when close links developed with Hausa cultivators following the nineteenth century religious wars (*jihad*) (Kerven 1992). British colonial policy led to rapid expansion and monetisation of cattle and grain markets (Kerven 1992) and today there is a complex marketing network which, in simplified terms, moves cattle southwards to the large urban centres and grain northwards from the main cultivation areas (FDLPCS 1992, Kerven 1992). Although this network, with its numerous agents, brokers and traders[4], has been criticised for lowering the producer price of cattle and pushing up grain prices relative to cattle prices (Mohamed Salih 1992), it provides a low capital, extensive system linking remote rural areas with urban markets (FDLPCS 1992), a situation quite different from that of the Borana and most East African pastoralists.

Pastoral FulBe have a long history of cultivation (Hopen 1958). Cultivation has increased during times of drought, grain shortages and animal disease (Mohamed Salih 1992) and as a response to the loss of grazing land due to expansion of settled cultivators (FDLPCS 1992) and irrigation projects (Mohamed Salih 1992). Cultivation is also a means of securing land and taking advantage of cultivator-biased government policies (Mohamed Salih 1992). However interaction with the market and cultivation by the FulBe is generally described in negative terms. Mohamed Salih (1992) states that the FulBe used to be unwilling to part with cattle, but this is changing as they become more dependent on the market for food, manufactured goods and services. Cattle are no longer reserve capital, and milk products have been commercialised. He argues that market dependence has forced some nomads out of the pastoral economy because the price of grain and services has risen relative to the price of livestock and milk.

Commercialisation is regarded as a recent development (Horowitz and Jowker 1992) and the commoditisation of cattle as a threat to the FulBe (Mohamed Salih 1992) but recent historical analysis of offtake shows that the FulBe have consistently sold high numbers of cattle, even to the point of zero herd growth, making efficient use of market capacity (Kerven 1992). Adverse terms of trade are not always the case. During the 1970s drought, FulBe pastoralists were forced to sell non-prime cattle (Kerven 1992) but the high demand for meat allowed prices to be maintained. Indeed, assertions that grain prices have risen relative to cattle prices are not supported either by the opinions of individual FulBe or the increase in national herd size

4.For a description see FDLPCS, 1992 and Mohamed Salih, 1992.

reflecting the stability of livestock as an investment in recent years.

FulBe pastoralists as cultivators

Some FulBe pastoralists have never farmed but this is the exception (Hopen 1958). Most transhumant pastoralists (the largest pastoral type) cultivate at the site of their main settlement, but even truly nomadic pastoralists may cultivate small areas near their wet season shelters. For many FulBe pastoralists, cultivation is not a regular activity; it is part of a basket of strategies which is continually re-assessed. Although cultivation is regarded with a certain scorn and fully sedentarised FulBe are often those who have been driven out of the pastoral economy, the practising of cultivation is not an indicator of relative poverty amongst pastoralists (Hopen 1958).

Faluwa: A case study

The case of the FulBe who are cultivating in Faluwa, Bauchi State, sheds light on this balancing of strategies. In 1989 three households of the Djahun'en clan came to Faluwa from Potiskum (Yobe State) where they had cultivated to a very limited extent (see Fig. 2). The growing human and cattle population, lack of water for their cattle due to irrigation projects and encroachment on grazing areas by settled cultivators forced these households to look for an alternative rainy season base. The Faluwa area had often been used for grazing in the dry season and, in return for tribute and taxes, land for cultivation and settlement was allocated to the Djahun'en clan members by the local Hausa chief.

Fig. 2: Map of Nigeria

Now, three years later, there are about eighty households who have come to Faluwa from Potiskum. Although each household has been allocated farm land, the amount cultivated varies from year to year. During their first year, new households allocate much of their own labour to farming activities and may use income from cattle and milk sales to hire farm labour. Cultivation strengthens their claim to the land in the eyes of the local Hausa community and other FulBe households, helps build a sense of security of tenure and means less outlay at times of high expenditure. Furthermore, the use of hired farm labour and builders to construct mud stores establishes ties with the local community.

In their second and third years in Faluwa, some households reduce their farming activity. The common model of transhumant pastoralists is one where the peak labour demand for crop farming is in the wet season (weeding and harvesting) and the peak labour demand for herding is in the dry season (when high mobility is needed to seek better pasture away from their wet season base) and the two production systems are therefore

complementary (Mohamed Salih 1992). As the FulBe in Faluwa are now based in their dry season grazing area, and some move back to Potiskum in the wet season, peak labour demands for herding and farming now clash. Consequently, the pastoralists either reduce the extent of their farming activity, remain in Faluwa throughout the year, or hire more farm labour.

Amongst those who return to Potiskum there are two main types. First, there are those who divide the household with some members, especially the elderly, remaining in Faluwa, while the others decamp to the north. These families store their grain in household storage cribs in Faluwa. Family members that move out take some grain with them in sacks but largely buy grain using the proceeds from milk and sometimes smallstock sales. Second, there are those who do not maintain a base in Faluwa. This group may not cultivate at all and therefore depend entirely on markets for cereals. Further groups cultivate for one or two seasons and then move out of cultivation. However for most of the households, Faluwa has become a year-round base, at least for the time being. Using techniques learnt from the Hausa, they cultivate cereals in response to the perceived high prices of grain in the market and to reduce the amount of milk sold and hence increase the milk available for children, adults and calves.

The three most commonly grown crops are maize, millet and sorghum and these are often supplemented with rice, yams and beans. The cultivation cycle begins prior to the rainy season when men, predominantly, clear and prepare the land. If hired labour is not used, most of the planting is done by women and during growth of the crop, children are often required to assist with weeding. Communal labour is also common.

Decisions concerning the time of harvest, and the harvest itself are the responsibility of the household head. Crops are cut, left on the cob or head and tied in bundles which either remain in the field to dry for a few weeks or are brought to the family compound where they are stacked on high platforms for further drying before being put into store[5].

Most of the grain is used for subsistence, and most households still have to buy in grain, especially before the mid wet season (*shetto*: April-May) but this is not a particularly disadvantageous time for the pastoralists: the quality of their cattle is improving with the lusher pasture, market prices of cattle have risen with the post dry season migration of other herders' cattle to the north, and there is a surplus of milk to sell. The most adverse terms of trade occur in the mid dry season (*seedu*: February-March) when the pasture is poorer, the numbers of cattle from the north have increased and grain prices

5.Only in one case did we encounter an owner who said that he had had problems with mould from inadequately dried grain, and this may have been due to an unseasonal shower rather than as the result of poor drying.

rise due to reduced availability and demand from southern buyers (see Fig. 3).

Fig. 3: Relative seasonal changes in grain and cattle markets

Amongst the men there is a general awareness that buying large quantities of grain after the harvest would be to their advantage, and most households have sufficient storage capacity to facilitate this (see below). However only wealthier families with larger herds are benefiting from bulk purchases of grain at harvest time.

Cattle are not normally sold to buy grain. In part this is because returns from the sale of smallstock are sufficient to buy grain for much of the year, while in the mid dry season when a young bull is only worth 400kg of

maize[6], terms of trade are considered too disadvantageous. Amongst the FulBe in Faluwa, income from milk does not affect grain purchases because milk income is controlled by women whereas it is men's responsibility to provide grain.

Another reason for not using cattle to obtain grain is found in the patterns of ownership and management of the herd. The households in Faluwa form a tightly-related clan-based community of the type that elsewhere has been considered in decline[7]. Grain purchase is primarily a household responsibility, but management of the herd takes place at a community level making it harder to dispose of cattle to meet individual basic needs.

Cattle sales and grain consumption are connected however. In times of stress, such as the droughts of 1972-1975 and 1982-1985 and the rinderpest epidemic of the early 1980s, cattle sales rose to meet basic needs. Moreover, small and large households tend to use hired labour on farms and this is often bought with the proceeds of cattle sales. Access to hired labour is a major determinant of how much land can be cultivated, and in general households have more land than they can farm. Unlike the more sedentary FulBe we met[8], there is no prohibition on women working in the fields although there is a division of tasks by gender. Indeed, if milk marketing is declining in importance, it is possible that female labour is being redirected away from milk marketing into crop cultivation.

Storage in Faluwa

Each household has one or more stores situated near the dwellings. The storage technology used by the FulBe is the same as their Hausa neighbours whom they employ as builders. Most stores consist of mud cylinders with a mud floor set off the ground on mud bricks. They have mud roofs capped with grass that may be left off during the dry season. There are also some basket stores of sorghum stover set on wooden frames above the ground.[9]

6.Compared to 1150kg in the early dry season.

7.See for instance Mohamed Salih, 1992, Horowitz and Jowker, 1992. See also the case study of non-cultivating pastoralists below.

8.See also Mohamed Salih (1992) on FulBe in the Gidan Magajia grazing reserve.

9.In other FulBe settlements we visited it was common for the crib designs to be borrowed from neighbouring sedentary communities and to employ their builders. There were therefore a wide variety of types reflecting the diversity of crib design in Nigeria.

Capacity of the stores ranges from 3-7m^3 for mud stores and from 1-5m^3 for basket stores, storing approximately 1300 - 3100kg and 450 - 2300kg of maize on the cob respectively. Mud stores have a longer life-span of up to ten years (with regular maintenance) whereas the basket types last on average five years and sometimes only three seasons. Typical stores are shown in Fig. 4.

In addition to storing grains, some households have storage for stover bought at the end of the harvest and kept for the dry season to be fed to lactating cows and sick cattle.

Farmers experienced some problems with rodents, termites and storage insects. Rodent entry is not controlled and the stores are mostly too near to the ground (less than 50cm) to use rat guards. The wooden poles used to

Fig. 4: Types of storage crib

a) Crib made from stones, mud & thatch; volume 3-7 m^3; capacity 1.3-3.1 tonnes.

b) Crib made from maize or sorghum stover, wood & thatch; volume 1-5m^3; capacity 0.5-2.3 tonnes

Some FulBe did however use basket cribs which they had brought with them into the Middle Belt region from further north (Blowfield and Donaldson, 1993).

support the sides of bigger basket stores provide excellent entry points for rodents and they have little trouble getting into stores through the sides or through the open roof of the mud stores.

Termites are more of a threat to the store structure than the grain inside and obvious termite attack was seen on the wooden platforms that hold up stores. This may cause the structure to collapse within a season.
Mud stores are usually held off the ground by stone stilts but these do not prevent termites attacking the walls. Only in one case had an attempt been made to control termites using chemical treatment (dichlorvos). Chemicals are generally expensive, rarely available and sold in open packets of dubious purity.

The FulBe do not feel that storage insects are a serious problem. There is little visible insect damage in the three main commodities but weevils (*Sitophilus* spp.) were seen in some stores.

A small number of maize samples, visibly damaged by insects, were taken for an assessment of weight loss using the `count and weigh' method[10] described by Boxall (1986). Results confirm field observations that weight loss caused by insects is negligible (<0.05%). Spot checks on moisture content[11] gave a mean of 7.4% moisture content. This figure is some 5% below the recommended safe storage limit for maize in tropical areas and would reduce insect populations to low levels. No respondents felt the need to use either chemical or non-chemical methods to control insects and whilst actellic is available in some of the local markets visited, it is rarely used.

Use of stores

For most of the households in Faluwa long-term storage is relatively new and control over stores is a subject of debate. In communities where cultivation is well established, men normally controlled access to the cribs, but in Faluwa the situation differs between households. In the case of the largest family (28 members) in the settlement, the husband and his senior wife control what goes into and what is removed from the household stores. The other three wives receive grain from the husband or eldest wife, but all four wives said they took grain without their husband's knowledge if they felt he had not given them sufficient money for purchasing basic needs.

In the case of the smallest family (4 members) the husband rigidly controls access to their single store. Cases from other communities suggest that control is more rigid in smaller households.

10.Also known as the gravimetric method.

11.Using the 6540 standard method of moisture content assessment.

Differentiation between households

As the above examples show, FulBe households in Faluwa are not homogenous. The importance in the production systems of both family and communal labour based on a variety of ties and obligations, together with an economic system favouring wealth-giving rather than private accumulation[12], means that household economic status can be estimated by the number of household members, including husband, wives, children, other productive relatives, adopted members and employees. Those households with the largest number of productive members will generally be the wealthiest, while those with the smallest number of members will be amongst the poorest.

The household of one of the two *jauro* in Faluwa consisted of 4 wives, 10 single daughters, 7 single sons, 4 single junior brothers living in the household and three permanently resident labourers giving a total of 28 members. There were also 4 daughters and 4 sons who had died. In contrast the smallest household in the same agropastoral community consisted of a husband, a wife and two non-productive age sons.

In theory, smaller families are not disadvantaged in groups where cattle rearing is the predominant production system: there is greater marginal productivity of labour in cattle production systems compared to grain cultivation as the same number of herders is required to look after one or thirty head of cattle. However, societal norms mean that as the herd grows so does a person's responsibilities to the group, clan or extended family, and through adoption and fostering-in of relatives and others, a small household with a large herd will grow in size.

Smaller families are more disadvantaged in crop cultivation than in animal husbandry because of the greater demands cultivation places on labour. Where there are young children and/or unproductive adults, grain produced by the household will not be sufficient, but there may not be cattle to sell or sale of cattle may affect the sustainability of the herd. To a limited extent, the shortfall in grain can be met by selling one's labour to wealthier farmers or by activities such as gathering and selling sorghum stalks. The extended family may also serve to alleviate the problem of insufficient grain through the provision of labour, money or food.

While larger families have more stores than smaller families, there is no apparent relationship between the existence or otherwise of stores and the

12.See for instance Stenning, 1959, Hopen, 1958, Frantz, 1975.

size/wealth of the household. However this needs to be looked into further.[13]

Gender and age-based differentiation within households

The composition of a household also has a significant effect in terms of production. As certain tasks are gender and age prescribed, household composition needs to be balanced as does herd composition (Horowitz and Jowker 1992).[14] The different strategies being adopted by different households in Faluwa mean that gender and age-based roles are currently subject to considerable change.

As with other pastoral FulBe, children in Faluwa become economically productive at an early age and children of ten years old or

13.At this stage, little is known about the impact of divorce, separation and outward migration, all of which have been reported elsewhere as common amongst the Fulani. Initial estimates of morbidity among children suggest figures are high.

14.Although, as Dupire (1963) has observed, gender prescription is not rigid, depending on the degree on the importance of cultivation and pastoralism at any given time.

Table 2: Gender and Age Determined Division of Labour

younger assist with herding and cultivation as well as in household maintenance activities (see also Stenning 1959 and Hopen 1958). Adolescent males in particular take a large responsibility for herding, especially away from the settlement. Adolescent females are active within the settlement and in some marketing.

Table 2 shows the different productive and reproductive tasks common to FulBe pastoralists divided according to gender and age. The exact tasks performed vary from household to household according to economic status, with wealthier families having greater choice between hired and family labour for certain tasks.

Most fields are managed by men who organise the family labour and pay for hired labour. Wives, children and household dependents as well as men work in the fields, but men are responsible for most grain sales and control the resultant income. Some women have their own fields in which the husband works in addition to other family members. Such women hold the right of disposal over any product although this may be affected, in ways that are not yet fully understood, by who pays for any hired labour used in these fields.

Although this is an area that needs further study, it is possible that, where milk yields are poor, women are more likely to sell their grain than store it. However, any income from grain comes after harvest when milk is also being sold, and it is unclear what overall impact this change of income source has on women's overall access to money.

Women also own and control the income from small ruminants and poultry, although again they have fewer resources than men, and Waters-Bayer's observation (1988) that FulBe women's income-generating activities are on the increase does not seem to hold true in Faluwa. Declining milk sales resulting from increased cultivation, together with continued focus on mainly male-owned cattle herds, increased time spent on cultivation activities for uncertain remuneration, and predominantly male control of cultivation outputs, all suggest that women's income-generating opportunities are not on the increase. A common complaint from married female respondents was that they were more financially dependent on men than in the past.

Children's access to land, cattle and other resources is entirely dependent upon adult relatives. It is possibly a growing trend for inheritance of cattle to be delayed until the owner's death, possibly to ensure family labour for cattle rearing, and perhaps to prevent maternal relatives gaining access to children's cattle in the case of divorce.

Except for hired labour, remuneration for different types of work is difficult to disaggregate. Adult males as a group have the greatest amount of resources, and take decisions on how to dispose of these resources without an obligation to consult female or junior household members. Women's cattle are managed within the husband's or agnatic kin member's herd, and disposal and control of resulting income is governed by a system that balances the interests of the individual and the group. In the event of divorce or separation, a woman keeps her cattle and normally returns to her

family. To what extent and under what circumstances women sell their cattle, other than to contribute towards their children's marriages, needs to be investigated further, but it is likely that women with young children and no husband will be under great pressure to dispose of their cattle to meet subsistence needs, especially if they come from a poor family.

Although children do not receive direct remuneration for their labour, they have the right to expect eventual remuneration through inheritance of the family's resources, and will be supported by their parents in getting married and other social events. Other dependents within the household do not necessarily inherit, but the head of a large household has responsibilities towards such members and will assist with their marriages and similar social events.

For adults, there are clear gender-based responsibilities relating to the provision of food. The senior male of a household is responsible for providing grain, while the female is responsible for supplying the ingredients of the soup or sauce eaten with the grain. In some households, declining income from the sale of dairy produce is blamed when women are unable to meet this obligation, and in such cases men are responsible for providing all the cooking ingredients.

Non-cultivating pastoralists

Amongst FulBe pastoralists who never or seldom cultivate, case studies from two groups of the Mbogoyanko'en and Bokolo'en clans show different approaches to storage.

The Mbogoyanko'en

The Mbogoyanko'en group consists of about fifteen households, originally from Katsina State before coming to Taraba via Bauchi State (see Fig. 2), they now have a semi-permanent site in Wukari used during the wet season.

Just as in the past increased cultivation by sedentary farmers forced the Mbogoyanko'en to move on, the same process is now being repeated in their dry season grazing areas. When the Mbogoyanko'en first arrived, these areas had been uncultivated but are now farmed in the wet season by Hausa and Tiv farmers. In 1992 the leader (*ardo*) of the Mbogoyanko'en cultivated for the first time in an attempt to increase land security, but the harvest did not produced grain. None of the group's members remain in Wukari during the dry season.

Up until the 1970s, milk and milk products made up the major part of the group's diet, but now with the growing shortage of water experienced in the dry season all households depend upon sorghum, maize and some rice. Although milk is sold in the wet season, grain is now consumed throughout

the year. Men buy it for their households using the proceeds of cattle sales.

Unlike the FulBe in Faluwa, cattle rather than smallstock are sold: the reason given is that proceeds from a sheep would not be enough to buy grain and cover the cost of transport from market to encampment. Encampments are considerably more remote than in Faluwa. However, as discussed earlier, this may also reflect the different nature of herd ownership between those in Faluwa and the Mbogoyanko'en group. In general, as the position of the clan and extended family declines, resources are increasingly owned by individuals who have right of disposal and control over any income. It may therefore be that the process of individualisation is more advanced in the Mbogoyanko'en group than in Faluwa.

A Mbogoyanko'en household buys enough grain for approximately one month's consumption. Although the people are aware that certain times of the year are more favourable for grain buying than others, the year-round offtake of unproductive animals from their large herds does not make this a vital consideration. They also make occasional use of credit from the trader that regularly sells them grain.

In the past grain was transported from market to encampment and between encampments by donkey, but now hired vehicles are used. It is stored by men in mass-produced sacks directly on the floor or on palettes inside their large dome-shaped grass shelters (*ruga*).

The Bokolo'en

The Mbogoyanko'en migrate far shorter distances than the Bokolo'en and yet are in some ways are `purer' pastoralists. The Bokolo'en who gather in Taraba State include households from Sokoto State, Borno State and Chad. Most leave family members behind and some of the households in Sokoto cultivate, although only on an occasional basis and with the perception that it is a poor man's activity. However grain has for generations constituted a greater part of the Bokolo'en diet than of the Mbogoyanko'en's.

The Bokolo'en do not produce enough grain to meet their own needs and bring with them only as much grain as they can carry on pack animals. Grain is acquired during the journey south with money from earlier cattle sales, through exchange and through the sale of stock and milk. Once in Taraba State they establish a dry season encampment near the Benue River where they remain for several months. They have used this site for over two decades and have established relations with a local butcher/trader who buys their cattle and provides storage facilities for grain that they have bought.

CONCLUSIONS

FulBe and Borana case studies show the importance of storage systems

to pastoralists under different and, in some aspects, contrasting circumstances. Both cases reveal that pastoralists are incorporating storage into their livelihood strategies, sometimes as a consequence of environmental stress but also as a routine element in a flexible array of strategies. Moreover, in contrast to market intervention and cereal bank initiatives, these systems are found at household and intra-household levels and do not necessarily mean or require that practitioners compromise their position as pastoralists.

From both social and technical perspectives there are no fixed solutions which are applicable in all cases. Climatic conditions, the extent to which cultivation is practised, interaction with non-pastoral communities, the nature of local marketing networks, and the availability of skills and materials, all affect the type of storage systems that are viable. Furthermore, different systems make different demands on labour, on settlement patterns and on financial and physical resources. Adoption of a certain storage strategy will in turn present its own opportunities and constraints.

The impact of storage systems cannot be understood by looking only at pastoralists as a homogenous group. The need for storage, the opportunities for exploiting it, management of outputs and access to the likely benefits are not the same for all members of a given pastoral community; they are affected by differences in wealth, gender and age.

It is possible that focusing on storage systems presents a new opportunity to assist with pastoralist food security; one that circumvents the initial sensitivity associated with herd manipulation, while at the same time, offering an entry point for understanding the complex social and economic relations which are necessary to monitor and assess impact. Working with field-based organisations is essential for achieving this, and it is regrettable that government and non-government organisations in Nigeria tend to regard the FulBe as a problem rather than as an exciting and dynamic partner.

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