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Cattle and cribs: an inter-disciplinary approach to grain storage amongst pastoralists in Ethiopia and Nigeria

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**CATTLE AND CRIBS: AN INTER-DISCIPLINARY APPROACH TO GRAIN
STORAGE AMONGST PASTORALISTS IN ETHIOPIA AND NIGERIA**

by

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INTRODUCTION

1. 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.

2. 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.

3. Cereal banks have been tried in several areas in response to market failures that cause inadequate food security for herders (Fowler and Moorehead, 1992). But there are doubts whether such interventions are ultimately sustainable or more effective than cereal traders (Berg and Kent, 1991).

4. For some pastoral communities cultivation of cereals and other crops offers a valve to release the pressure of environmental stress provided that they are able to store their harvests effectively. For others the stress is increased because the communities are unable to buy grain at favourable prices and then store it when grain prices rise.

5. 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 from both the technical and social sides.

STORAGE SYSTEMS FOR THE BORANA, ETHIOPIA

6. This was the situation facing CARE field-workers on the Borana Rangelands Development project in Sidamo province, Ethiopia. The mid-eighties drought had led to the Borana selling livestock at distress prices to buy grain. It was feared that in the longer term many would

be forced to leave the pastoralist production 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 thereby helping to improve the health situation (ibid). CARE therefore began a programme to promote the use of storage systems allowing the Borana to buy grain when it was cheap and store it for consumption when the terms of trade shifted against pastoralists (Donaldson, 1991).

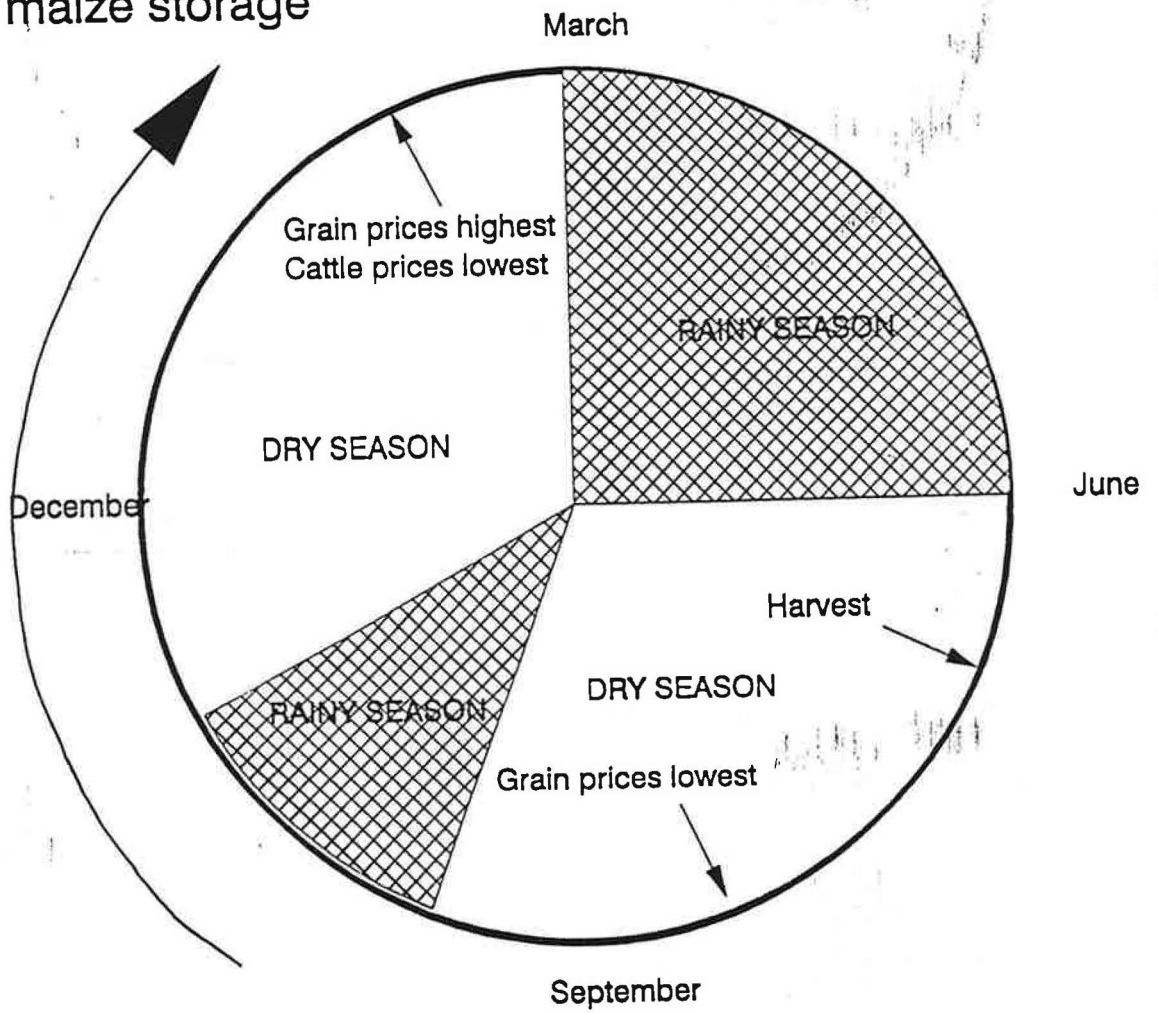
7. The Borana responded to the 1984-1985 drought by building many community stores, using both underground and above ground designs. The main cereal consumed is maize which is bought loose or, in cases where the Borana cultivate, stored on the cob. CARE promoted underground pits lined with fired clay or cement, but these suffered mould losses of up to 16% (Hodgson, 1990). Subsequently the Storage Management section of the Natural Resources Institute (NRI) was asked to advise on these early problems and assist with a system for improved storage design and extension.

8. Although relevant to reducing the vulnerability of pastoralists to environmental stress and food insecurity that can cause sedentarisation (see for instance: Ellis et al, 1989), the Borana initiative also addressed the perennial problem of adverse terms of trade during the December - March dry season (see Figure 1). This is when grain consumption is highest, but the latter part of the season is when grain prices peak and cattle prices are lowest. Cattle prices rise with the onset of the main rainy season in March and are highest in May and June. They fall from then until September, but at this time grain prices are at their lowest following the harvest. Therefore the Borana would benefit if they could avoid exchanging cattle for grain in the December - March dry season by buying grain after the main harvest and storing it in community stores for the period before the main rainy season when cattle prices rise (Donaldson, 1991).

Developing Storage Technology amongst the Borana

Figure 1: Relative seasonal changes in grain and cattle markets

Period of maize storage



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

- a. a cement-lined pit based already being promoted by CARE;
- b. a modified cement-lined pit;
- c. a modified clay-lined pit;
- d. an above-ground store.

10. Each of the designs was a modification of existing designs and technologies¹ and as far as possible used readily available materials and transferable skills. The pits were supplemented by drying racks, and to help eliminate damp inside the store pits were lined with ash then with 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.

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

12. Workshops were held for CARE personnel assisting in the trial, for masons and trainee masons helping in storage construction, and for extension staff on store capacity, construction and sampling protocol, and on SWOT² analysis of each store type.

Lessons from the Borana

13. The final results of these trials have not yet been published, but a number of issues arose during their implementation. First, the rapid uptake of stores by the Borana since 1985 shows that there is an interest in storage amongst pastoralists in certain conditions.

¹ For detailed diagrams of the designs used and of other local designs see Donaldson, 1991.

² Strengths, Weaknesses, Opportunities and Threats

However, even working closely with community-oriented extension programmes, there are many social and economic aspects that need to be considered. The Borana as a group, for instance, can be socially and economically differentiated and this will have an impact upon the access to and control over a new technology.

14. Second, local conditions affect the technologies adopted. Stores need to be suited to the climate, but also to the resources available to the community. Cob maize and loose maize, for example, optimally require different conditions. Therefore, people cultivating grain and people buying grain have different opportunities. Sparse distribution of markets can increase the amount of grain that needs to be acquired and stored. The skills and materials needed to build and maintain the stores have to be readily available.

15. A vital consideration is the variety of pastoralism practised. The frequent, long distance movement often necessary to meat and dairy pastoralism 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 anything more than immediate cereal needs requires some form of semi-permanent or permanent site which needs to be guarded and maintained. This decision has already been faced by agro-pastoralists who have stores near their farms. But for those pastoralists without a long-term settlement, establishing stores has major implications for labour allocation and land.

16. The utility of storage also relates to the coping strategies adopted by pastoralists. Table 1 shows how storage plays different roles depending on the position of the herding system, and may have no role to play under certain conditions. It is also the case that storage will be perceived differently by pastoralists who move into cultivation temporarily as a way of increasing the sustainability of the herd, compared to those whose herds are in permanent decline. *"Herders in these latter systems can be considered to be adapting to new productive opportunities for the long-term, rather than coping with short-term shocks, and are thus moving out of the pastoral sector."* (Fowler and Moorehead, 1992: 14)

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.

Source: adapted from Fowler and Moorehead, 1992

GRAIN STORAGE AND FULBE PASTORALISTS

17. The lessons learnt with the Borana were subsequently used in a pilot study with Fulbe pastoralists in northern Nigeria.³ Approximately 11,500,000 of the nation's almost fourteen million cattle are managed by pastoralists (FDLPCS, 1992), the largest group of which are the Fulbe (Frantz, 1978).

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.

18. With an estimated value of 60 billion naira (FDLPCS, 1992), pastoralist-managed cattle represent a significant proportion of Nigeria's renewable natural resource. On top of this needs to be added the value of milk and milk products. In a study of central Nigerian Fulani, Waters-Bayer (1988) reported an average annual milk offtake of 0.7 litres per cow per day with an early wet season high of 1.4 litres per day.

19. 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 *jihad* (Kerven, 1992). British colonial policy led to rapid expansion and monetisation of cattle and grain markets (*ibid*), 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 of different sizes⁴ 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.

20. Pastoral Fulbe have a long history of cultivation (Hopen, 1958). This has been a response to a number of situations. Cultivation has increased during times of drought, grain shortages and animal disease (Mohamed Salih, 1992), as a response to the loss of grazing land because of expansion of settled cultivators (FDLPCS, 1992) and irrigation projects (Mohamed Salih, 1992), and as a means of securing land and taking advantage of cultivator-biased government policies (*ibid*). High tax demands by the British administration in the 1930s led to the Fulbe growing more grain and rearing more smallstock (Kerven, 1992), and Watts (1987) says that exploitative market relations have motivated Fulbe grain cultivation in recent times.

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

21. Fulbe interaction with the market and the related practising of cultivation 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 this 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.

22. 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). Furthermore, it is not always the case that environmental stress results in adverse terms of trade. During the 1970s drought, Fulbe pastoralists were forced to sell non-prime cattle (ibid), but the impact was not disastrous because of the high demand for meat at that time which 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 fact that the national herd is increasing in size reflecting the stability of livestock as an investment in recent years.

Fulbe Pastoralists as Cultivators

23. 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 pure pastoralists may cultivate small areas near their wet season shelters. Although cultivation is regarded with a certain scorn, and although 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.

"There is no clear-cut correlation between the

size of a man's herd and his disposition to farm; that is, herdsmen with comparatively large herds may have farms, while those with relatively small herds may not farm at all." (Hopen, 1958: 30)

24. For many Fulbe pastoralists, though, cultivation is not a regular activity; it is part of a basket of strategies which, at least by viable members of the pastoral system, is continually reviewed perhaps even annually. Cultivation and pastoralism are for many Fulbe part of a continuum, and they must make decisions about what resources can and should be allocated to cultivation at different times and under fluctuating conditions.

Faluwa: A Case Study

25. The case of the Fulbe who are cultivating in Faluwa, Bauchi State, shed 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, but the growing human and cattle population was forcing them to look for an alternative rainy season base. Originally from Hadeija, Kano State, lack of water for the cattle due to irrigation projects and encroachment on grazing areas by settled cultivators had forced them to leave.

26. They had often brought their cattle to the Faluwa area in the dry season and, apart from knowing it had a good water supply and pasture, were encouraged by the peaceful relations between the local Hausa and a sedentary Fulbe community that had been living in the area for fifty years. Led by their *jauro*, the first households approached the local Hausa chief who in return for tribute and taxes allocated land for cultivation and settlement.

27. Three years later, there are now about eighty households who have come to Faluwa from Potiskum. They are divided into two wards, each with its own *jauro*. Although each household has been allocated farm land, the amount used 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. This strengthens their claim to the land, both in respect to the local Hausa community and other Fulbe households, and helps build a sense of security of tenure. It also means less outlay will be needed to obtain cereals at a time of high expenditure (tribute, construction, hired labour). Furthermore, the use of hired farm labour and often builders to construct mud stores establishes ties with the local community.

28. But 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 farming is in the wet season (weeding and harvesting) and the peak labour demand for herding is in the dry season (high mobility to seek better pasture away from their wet season base); the two production systems are therefore complementary (Mohamed Salih, 1992). But Fulbe in Faluwa are now based in their dry season grazing area, and some move back to Potiskum in the wet season. For those that move, herding is now most labour-demanding during the same period as peak labour demand for farming. Consequently, the pastoralists either reduce the extent of their farming activity, remain in Faluwa throughout the year, or hire in more farm labour.

29. Amongst those who return to Potiskum there are two main types. First, there are those who divide the household with some, especially elder members, remaining in Faluwa and the others decamping to the north. These families store their grain in household storage cribs in Faluwa. Those that move out take some grain with them in sacks but largely buy grain using the proceeds from milk and sometimes smallstock sales.

30. Second, there are those who do not maintain a base in Faluwa. Some of these may not cultivate at all and therefore depend entirely on the markets for cereals. Others cultivate for one or two seasons then move out of cultivation.

31. But for most of the households Faluwa has become a year-round base, at least for the time being. Using techniques learnt from Hausa labourers, they cultivate

cereals because of the perceived high price of grain in the market and to reduce the amount of milk sold so as to increase the amount available for children, adults and calves.

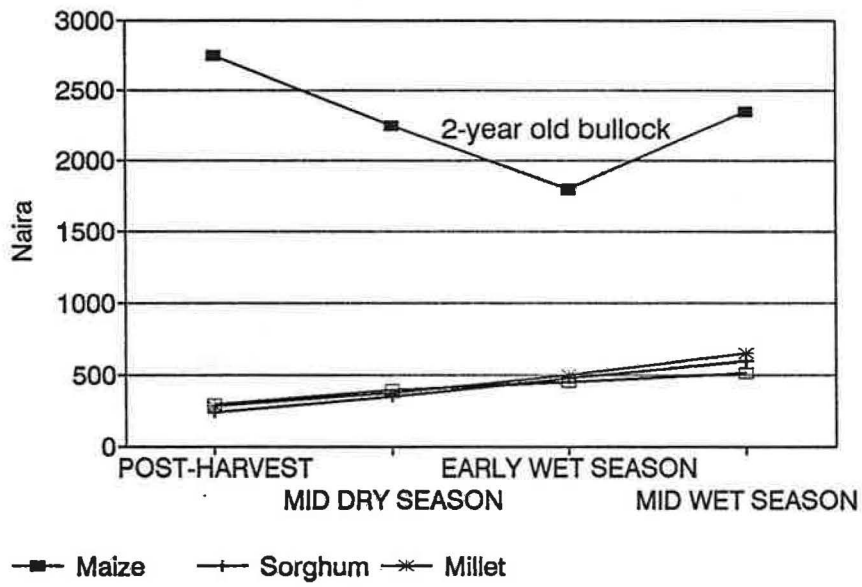
32. The three most commonly grown crops are maize, millet and sorghum and these are often supplemented with others such as rice, yams and beans. The cultivation cycle begins prior to the rainy season when predominantly men are involved in land clearing and preparation. Seed is generally selected from the previous year's harvest with small amounts bought in from local markets (e.g. beans) or obtained from relatives or neighbours. 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.

33. Decisions about the time of harvest, and the harvest itself is the responsibility of the household head and crops are cut, left on the cob/head and tied in bundles. These bundles are either left in the field to dry for a few weeks or brought to the family compound where they are stacked on high platforms for further drying before being put into store. Only in one case did the owner say he had problems with grain not being dried thoroughly and consequent mould problems developed, although this may have been due to an unseasonal shower rather than poor drying.

34. Most of the grain is 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 pastoralist: the quality of cattle is improving with the lush pasture, market prices have also 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) due to poorer pasture and the number of cattle from the north. At the same time grain prices are high due to reduced availability and the demand from southern buyers. (see Figure 2)

35. There is a general awareness amongst the men that

Figure 2: Diagrammatic Representation of Seasonal Market prices of Grain & Cattle



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, few households take advantage of this opportunity, either because they are reluctant to exchange cattle for grain or because doing so would affect the sustainability of their herds. Consequently only wealthier families with larger herds are benefiting from bulk purchases at harvest time.

36. But cattle are not normally sold to buy grain. In part this is because the sale of smallstock is enough to buy grain for much of the year, while in the mid dry season when a young bull is only worth 400 kg of maize⁵ the 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 the women whereas it is a man's responsibility to provide grain.

37. Another reason for no using cattle to obtain grain is the ownership and management of the herd. The households in Faluwa are a tightly related clan-based community of the type that elsewhere has been considered in decline.⁶ Grain purchase is primarily a household responsibility, but management of the herd takes place at higher level making it harder to dispose of cattle to meet individual basic needs.

38. Cattle sales are connected to grain 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 on how much land can be cultivated, and in general households have more land than they can farm.

⁵ Compared to 1150 kg in the early dry season.

⁶ See for instance Mohamed Salih, 1992, Horowitz and Jowker, 1992. See also the Mbogoyanko'en case study below.

Unlike more sedentary Fulbe we met,⁷ there is no prohibition on women working in the fields although there is a gendered division of tasks. Indeed, if milk marketing is declining in importance, it is possible that households are redirecting female labour from that into cultivation.

Storage in Faluwa

39. 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 were also some basket stores of sorghum stover set on wooden frames above the ground.⁸

40. The capacity of the mud and basket type stores ranges from 3-7m³ for the mud stores and from 1-5m³ for the basket stores, which could store approximately 1300 - 3100 kg and 450 - 2300 kg of maize on the cob inside each type 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 Figures 3 and 4.

41. In addition to storing grains, some households had storage for stubble bought at the end of the harvest and kept for the dry season to be used by lactating cows and sick cattle.

⁷ See also Mohamed Salih (1992) on Fulbe in the Gidan Magajia grazing reserve.

⁸ In other Fulbe settlements we visited it was common for the cribs to borrow designs 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. 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).

Figure 3 & 4: Types of crib

Illustration
to follow

42. Farmers experienced some problems with importance, rodents, termites and storage insects. Rodent entry is not controlled and the stores are mostly too near to the ground⁹ to use rat guards. The wooden poles used to 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.

43. 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 has 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. Building stores away from termite mounds does not provide control as many termite species living in tropical regions do not build mounds (Logan, personal communication).

44. The Fulbe do not feel that storage insects are a serious problem. There is little visible insect damage in the three main commodities (except in one case where heavily damaged bulrush millet was said to have been in store for 3 years). There are some *Sitophilus* spp.

45. A small number of maize samples were taken for an assessment of weight loss due to visible insect damage using the gravimetric method described by Boxall (1986). Results confirm field observations that weight loss caused by insects is negligible (<0.05%). Spot checks on moisture content using the ISO 6540 standard 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.

46. 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

⁹ Less than 50 cm off the ground .

visited, it is rarely used. Only in one case was there evidence of any fungal attack on stored grain (due to an unseasonal shower).

Use of Stores

47. For most of the households in Faluwa long-term storage is relatively new and control over stores is a subject of debate. In communities that had been cultivating for longer men normally controlled access to the cribs, but in Faluwa the situation differs between households. In the case of the largest family in the settlement,¹⁰ 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 the husband's knowledge if they felt he had not given them sufficient money for purchasing basic needs.

48. In the case of a smallest family¹¹ the husband rigidly controls access to their single store, and he takes responsibility for selling any surplus. Cases from other communities suggest that control is more rigid in smaller households.

Differentiation between Households

49. 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

¹⁰ 28 members.

¹¹ Four members.

¹² See for instance Stenning, 1959, Hopen, 19~~32~~⁵⁸, Frantz, 1975.

members will generally be the wealthiest, while those with the smallest number of members will be amongst the poorest.

50. The example of one of the two *jauro* in Faluwa provides an example of a large household's composition:

Number of wives	4
Number of single daughters	10
Number of single sons	7
Single junior brothers living with respondent	4
Number of permanently resident labourers	3
Total	28
(NB: Respondent also had four daughters and four sons who are deceased.)	

51. In contrast the smallest household in the same agro-pastoral community consisted of a husband, a wife and two non-productive age sons.

52. The characteristics of large and small households are shown in Table 2.

53. In theory, smaller families are not disadvantaged in groups where cattle rearing is the predominant production system because of the greater marginal productivity of labour in this system compared to grain cultivation, the same number of herders being required to look after one or thirty head of cattle. However, societal norms mean that as the herd grows so do 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.

54. Smaller families are more disadvantaged where cultivation is more important to subsistence than cattle because of the greater demands cultivation places on labour. Where there are young children and/or unproductive adults, there is a strong likelihood as the herds of small families are usually not as large that own-grain production will not be sufficient, and there

Table 2: Economic Differentiation Between Households

Large Households	Small Households
Have largest herds of cattle.	<ul style="list-style-type: none"> ● Less likely to have cattle. ● In some groups more likely to be involved in cultivation.
More likely to have to sell cattle to buy sufficient grain, but this less likely to affect herd sustainability.	Sale of cattle to buy grain more likely to have an impact on herd sustainability, but more likely to be able to meet grain needs by selling small-stock.
More likely to use hired labour for cultivation.	<ul style="list-style-type: none"> ● Women more likely to be involved in cultivation. ● Less likely to employ hired labour. ● Men more likely to sell their labour.
More likely to have surplus grain either for sale or storage.	Less likely to produce enough grain to meet own needs.
More likely to have resources for capital expenditures.	Less likely to have resources for capital expenditures.
More likely to be able to select opportune times for selling and buying.	Less likely to be able to select opportune times for selling and buying.

may not be cattle to sell or any sale of cattle will affect the sustainability of the herd. To an extent, the shortfall in grain can be met by selling one's labour to wealthier farmers or activities such as gathering and selling sorghum stalks. The extended family may also serve to alleviate the problem through the provision of labour, money or food.

55. While larger families have more stores than smaller ones, there is no apparent relationship between the existence or otherwise of stores and the size/wealth of the household although this needs to be looked into

further.¹³

Gender and Age-Based Differentiation Within Households

56. The composition of a household is equally significant as its size in terms of production. As certain tasks are gender and age prescribed, family composition needs to be balanced just as 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.

57. As with other pastoral Fulbe,¹⁵ children in Faluwa become economically productive at an early age with children of ten years old or younger assisting with herding and cultivation as well as in household maintenance activities. Adolescent males in particular take a large responsibility for herding, especially away from the settlement, while adolescent females are active within the settlement and in some marketing, although it is likely that many still marry at puberty and become involved in reproduction.

58. Table 3 shows the different productive and reproductive tasks common to Fulbe pastoralists divided according to gender and adult-child age. The exact tasks performed vary from household to household according to

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. Some attempt was made to estimate the levels of morbidity from the number of living and dead children in a household. These figures suggest that morbidity is high.

¹⁴ Although, as Dupire (1963) has observed, gender prescription is not rigid, and alters depending on the greater or lesser degrees to which cultivation and pastoralism are being practised at any given time.

¹⁵ See for instance Stenning, 1959 and Hopen, 1958.

Table 3: Gender and Age-determined Division of Labour

Women		Men	
Adult	Child	Adult	Child
<p>Reproduction & domestic:</p> <ul style="list-style-type: none"> ● child rearing ● food preparation ● cooking ● provision of clothing ● some provision of bride price & other social gifts ● provision of ingredients for soup* 	<p>Reproduction & domestic:</p> <ul style="list-style-type: none"> ● help in food preparation ● water collection ● firewood collection ● pounding of grain 	<p>Reproduction & domestic:</p> <ul style="list-style-type: none"> ● provision of clothing ● primary provision of bride price & other social gifts ● provision of grain for consumption ● collecting of wild plants for food 	<p>Reproduction & domestic:</p> <ul style="list-style-type: none"> ● firewood collection ● collecting of wild plants for food
<p>Cattle rearing:</p> <ul style="list-style-type: none"> ● some ownership of cattle* ● some milking ● preparation & selling of dairy produce 	<p>Cattle rearing:</p> <ul style="list-style-type: none"> ● feeding of calves ● some herding of cattle near compound ● some milking 	<p>Cattle rearing:</p> <ul style="list-style-type: none"> ● ownership of cattle ● herd maintenance (health, grazing, water management, allocation of milk, drawing of water) ● milking ● herding of cattle ● selling of cattle 	<p>Cattle rearing:</p> <ul style="list-style-type: none"> ● feeding of calves ● herding of cattle ● milking
<p>Other livestock:</p> <ul style="list-style-type: none"> ● some ownership of small ruminants & poultry ● some maintenance of own smallstock ● selling or other use of own smallstock 	<p>Other livestock:</p> <ul style="list-style-type: none"> ● some herding of smallstock 	<p>Other livestock:</p> <ul style="list-style-type: none"> ● ownership of small ruminants and poultry ● maintenance of smallstock ● selling or other use of smallstock 	<p>Other livestock:</p> <ul style="list-style-type: none"> ● herding of smallstock
<p>Grain cultivation:*</p> <ul style="list-style-type: none"> ● planting ● drying ● cleaning ● transportation ● management of store by wives (especially in richer households) 	<p>Grain cultivation:*</p> <ul style="list-style-type: none"> ● weeding ● shelling ● pounding 	<p>Grain cultivation:*</p> <ul style="list-style-type: none"> ● land clearing & preparation ● harvesting ● storing ● management of store 	<p>Grain cultivation:*</p> <ul style="list-style-type: none"> ● weeding ● shelling
<p>Other economic activities: (unknown)</p>	<p>Other economic activities:</p>	<p>Other economic activities:*</p> <ul style="list-style-type: none"> ● commercial grain milling ● selling of labour (eg herding, blacksmithing, cultivating) ● other income generation activities (eg collecting & selling sorghum stalks for thatch) 	<p>Other economic activities:</p>

* Subject to economic status of household.

economic status with wealthier families having more of a choice between hired rather than family labour for certain tasks.

59. We have already seen how gender affects storage and mentioned women's involvement in cultivation. Most fields are managed by men who organise the family labour and pay for hired labour. Wives, children and other household dependents work in these fields as well as the men, 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, although a question mark remains as to who pays for any hired labour used in these fields.

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

61. Women also own and control the income from small ruminants and poultry, although again they have less resources than men. But 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 more cultivation, continued focus on mainly male-owned cattle herds, increased time spent on cultivation activities for uncertain remuneration, and predominantly male-controlled 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 dependent financially on men than in the past.

62. 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, perhaps to ensure family labour for cattle rearing, and perhaps to prevent maternal relatives gaining access to children's cattle in the case of divorce.

63. 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, who normally returns to her family, keeps her cattle. 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 greater stress to dispose of their cattle to meet subsistence needs, especially if they come from a poor family.

64. Although children do not receive direct remuneration for their labour, they have the right to expect eventual remuneration through inheritance of the family resources, and will be supported by their parents when getting married and for 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 other social events.

65. 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 for women being unable to meet this obligation, and in such cases men are responsible for providing all the cooking ingredients. But the division of responsibility still applies in many households.

Non-cultivating Pastoralists

66. Amongst Fulbe pastoralists who never or seldom cultivate, case studies from two groups moving to Taraba

State for the dry season from Mbogoyanko'en and Bokolo'en clans respectively show different approaches to storage. The Mbogoyanko'en group consists of about fifteen households, originally from Katsina State who had moved to Bauchi State before coming to Taraba where they now have a semi-permanent site in Wukari used during the wet season.

67. Just as increased cultivation by sedentary farmers had forced them to move on in the past, the same process is happening now in their dry season grazing areas which when they first arrived had been uncultivated bush but is now farmed in the wet season by Hausa and Tiv farmers. In 1992 the group's leader (*ardo*) cultivated for the first time in an attempt to increase land security, but the harvest had not produced grain. None of the group's members remained in Wukari during the dry season.

68. 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.

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

70. A household buys enough grain for approximately one month's consumption. Although the people are aware that some times in the year are more favourable for 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.

71. The grain used to be transported from the market to the encampment and between encampments by donkey, but now hired vehicles are used. It is stored by men in sacks directly on the floor or on palettes inside their large dome-shaped *ruga*.

72. The Mbogoyanko'en migrate far shorter distances than the Bokolo'en and yet are in some ways '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 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 their diet than the Mbogoyanko'en's.

73. 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 they have bought at the local market or from farmers. The purchased grain is taken to the encampment by both men and women.

CONCLUSIONS

74. Fulbe and Borana case studies show the importance of storage systems to pastoralists under different and to an extent contrasting circumstances. Both reveal that pastoralists are incorporating storage in 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

fatally compromise their position as pastoralists.

75. From both social and technical perspectives there are not 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, 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.

76. 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.

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

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