



## The pastoral livestock in the Grand Kanem: between vulnerability and resilience

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<p>Article history Received: 18 Sep, 2014 Revised: 20 Nov, 2014 Accepted: 1 Dec, 2014</p>	<p><b>Abstract</b></p> <p>In order describe the socio-economic characteristics and strategies of herders to match the size of the family and that of livestock; a cross-sectional survey was conducted with 67 transhumant agro-herders, 42 nomadic herders and 21 sedentary agro-herders breeders in the Grand Kanem. Pastoralist communities in the region are Kanembou, Gorane, Arabs and Fulani. Three livestock systems are used in the region: sedentary agro-herding (21%), transhumant agro-herding (51%) and nomadic herding (28%). The average size of a herd of cattle or camels varied significantly (<math>P &lt; 0.05</math>) from one farming system to another. A class distribution of herders showed that more than half of nomadic herders and transhumant agro-herders held between 40 and 80 heads of cattle while the majority of livestock herders (85%) had a head count of cattle between 1 and 20 animals. The ratio of herd size and that of the family showed a TLU (Tropical Livestock Unit) per person twice more than that of transhumant agro-herders and six times more than that of transhumant agro-herders. The evolution of herds of different species has been appreciated by sedentary agro-herders. For half of them, the number of cattle and sheep has been declining over the past decade while those of goats and camels are stable. Cattle were most sold by nomadic herders followed by transhumant agro-herders. Grain cost represented the largest source of expenditure among nomadic herders and transhumant agro-herders followed by sugar and tea and animal health care. However, among sedentary agro-herders, buying cattle feed was by far the largest source of expenditure. Overall the study showed that despite the many challenges, pastoral systems play an important role in the economy of the region and contribute to nutrition and food security of rural households. The study recommends a more secure pastoral system by the introduction of water programs, feed banks, livestock and rural health prophylaxis campaign.</p> <p><b>Keywords:</b> Chad, characteristics, farmer strategies, livestock;; Kanem;</p>
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### Introduction

Pastoral farming has a special place in the Grand Kanem because it plays an important role in the economy and food security of local populations (Sougnabé, 2014). This vast (123,000 km<sup>2</sup>), arid (average 200 mm of rain/year) region is one of the major breeding areas of the country. It covers a wide

range of agro-ecological zones, ways of exploitation modalities and of economic activities. As far as animal production, it covers a broad spectrum of systems ranging from nomadic herding to sedentary agro-herding through Transhumant agro-herding Ruminant population in the area is estimated in 2012 to 218,000 heads of cattle, 529,000 small ruminants and 238,000 camels representing approximately 467,000 TLU

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(Tropical Livestock Unit). On this basis, the Grand Kanem stands as the region where households have the largest number of animals (18/TLU/household). Pastoral farming is practiced widely depending on environmental conditions including rainfall, indispensable component for pasture regeneration, the filling of ponds and water tables. But for decades, the Grand Kanem like the rest of the Sahel, is subject to recurrent droughts and rainfall irregularities. This led to a significant drop in natural resources (water, fodder and grain) and significant livestock mortality. This results in severe food insecurity that undermines the livelihoods of households. Kanem population is among the most vulnerable in Chad. According to WFP, 65% of households were food insecure in 2010 and 75% would still be in this situation in 2012; In 2010, 27% of young children suffered from acute malnutrition (including 5% severe malnutrition) with "mortality rates close to an emergency" situation (FewsNet 2010).

Maintaining livestock activities and especially securing pastoral mobility in this little area suitable for agriculture are essential to the survival of the population. This study describes the socio-economic characteristics and strategies of pastoralists to match family size and the number of livestock for their daily survival.

## Materials and Methods

### The study area

It corresponds to what is called the Grand Kanem and comprises two administrative regions: Kanem and Bahr El Ghazal. This is actually the former Kanem (Figure 1) the capital of which was Mao. Like the rest of the Sahel, the climatic conditions in the Grand Kanem are severe. The land is marked by a large surface of sandy soils and sand dunes with occasional inter-dune depressions, sort of oasis called ouaddis. It is a difficult region to access, roads are negligible reminding the country's road network.

### The literature search

The review of the literature on livestock in the Grand Kanem has allowed us to characterize pastoral societies in the area and livestock systems practiced.

### Field surveys

They took place in January 2013 and have used various tools including meetings with resource persons, group and individual interviews and with herders in camps. Meetings with resource persons: in the places visited, contacts have been established with the local technical services (livestock, agriculture, etc.), representatives of the federations of herders, administrative authorities (Sub-prefects, heads of Districts, villages or camps). The objective of this

meeting was firstly to explain the purpose of the work to be undertaken and also to inquire about positions and accessibility of different groups of pastors present in their locality.

Group interviews are a qualitative method used in social sciences research which allows collecting in a participatory way data corresponding to different topics related to pastoral practices. In a camp or village, volunteer sedentary agro-herders (six to twelve people depending on their availability) were grouped together. Exchanges generated by these people (men, women and children) have focused on herd development, climate, pasture and animal health. These interviews were used to assess the needs, expectations, satisfactions and understanding opinions, motivations and behaviours of herders.

Individual interviews were carried out on the basis of a semi-structured interview guide. The issues discussed focused on family characteristics, herd composition, total number of heads and by age class of livestock, the trend of animal numbers, receipts resulting from the sale of livestock and animal by-products, the sales of animals, the expenditures (food, animal care, clothing, etc.). During the investigation which lasted one week, 67 transhumant agro-herders, 42 nomadic herders and 21 sedentary agro-herders were interviewed. In addition to the surveys, direct observations were made on certain practices such as the organization of the migratory travels the social relationships, etc. Which are difficult to grasp through questionnaires.

### Analysis of the data collected

The information from the focus groups was analyzed as it was gathered. The quantitative data collected during individual interviews were entered in Excel and processed using SPSS software 12 +.

## Results

### Pastoral societies in the Grand Kanem

Kanem herders fall into four main ethnic groups: Kanembou, Toubou, Fulani and Arabs

**a) The Kanembou** are the majority (61%) and form a homogeneous population and speak Kanembou language. They are sedentary agro-herders with property rights on ouaddis. They grow early varieties of millet on the dunes and off season crops in ouaddis. They raise cattle and small ruminants as a secondary activity and often have male camels used as pack animals.

**b) The Toubou** occupy a vast region of the Central Sahara from Eastern Niger to Southern Libya and Northwestern Chad where they might have been present



Fig. 1: The study zone

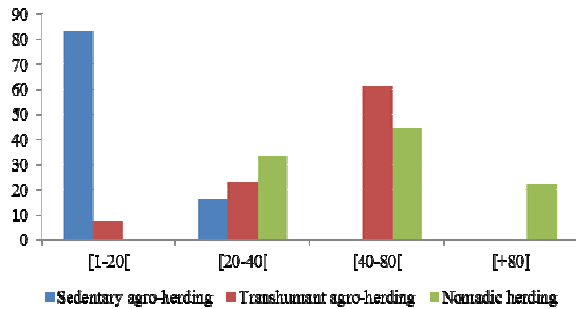


Fig. 2: Breakdown of cattle population according to farming system in Grand Kanem (Chad)

since the ninth century (Clanet, 1975). So the word “Toubou” is of Kanembou origin (Le Rouvreur, 1989) and was used to refer to communities whose common origin is not established. The Arabs themselves have used the word “Gorane”. Bourgeot (1994) and Barraud et al. (1997) identified, among others, the Teda or tedaga group and that of Daza or Dazagada with even finer subdivisions with many sub-groups. The Daza populate the northern kanem (Noukou, Rig-Rig, etc.) while the Kreda and the Kécherda live mainly in Bahr El Ghazal. From now on in this document, the word will be used generally to mean the people belonging to the Toubou group.

c) **The Fulani** are a large ethnic group in many countries of the Sahel. Their origin is unknown and assumptions are numerous. Some authors (Boutrais 1988) adhere to the hypothesis of a West African origin, including the Fouta and Macina. In our study area, we met a group of Fulani herders: the Waila largely settled near Rig-Rig and Kékédina where they engage in cattle and small ruminants breeding with seasonal migration of low amplitude.

d) **The Arabs** are from the Arabian Peninsula as reported by Rouvreur (1989). They could be divided into three major genealogical groups: the Hassaouna, the Djoheïna and the Oualad Sliman, themselves divided into several clans and factions. The Kanem’s Arabs are Oualad Rachid and Khozam that could be Djoheïna. Originally from Batha, they might have moved into these areas as a result of the drought of 1983-1984. Since then, they move between south Kanem, Hadjer-Lamis and Chari-Baguirmi. In northern Kanem, Arab camel owners from Libya known as Oualad-Sliman can be found.

### Farming systems practiced

Different grazing systems are distinguished by their degree of mobility and/or fixity, the degree of association of livestock species and agriculture and their management and use of space. Based on these elements, there are three breeding systems in Grand Kanem: sedentary agro-herding, Transhumant agro-herding and nomadic herding (Table 1).

### The sedentary agro-herding

The sedentary agro-herding is practiced by 21% of herders in the area; the majority (90%) are Kanembou. In this system, the herds graze around the village and come back every day into the owner’s yard. Rangelands in the dry season and the rainy season are almost the same. However, the joint search for water and pasture sometimes makes the dry season rangelands wider than the rainy season ones. In addition to rangelands, animals prefer dune culture residues and Ouaddi vegetation. Transhumance is exceptional and intervenes only in cases of extreme drought.

### The transhumant agro-herding

This system that combines livestock and subsistence farming uses two habitat types: one fixed and the other mobile. It is also characterized by greater regional stability that allows social control over the grazing area and a division of the herd and the family labour at a certain time of the year. The fixed residence usually located in the home land is an area where part of the family stays all year or part of the year. Sometimes this fixed residence is located in the host area. Transhumant agro-herding is the most practiced

**Table 1: Characterization of pastoral systems in the Grand Kanem (Chad)**

Breeding systems	Characteristics			
	Species	Habitat type	Production system	Mobility (km)
Nomadic herding	Camel	Mobile	Breeding	Over 50
Transhumant agro-herding	Mixed herds	Mobile et fixed	Breeding and secondarily agriculture	25-50
Sedentary agro-herding	Cattle	Fixe	Agriculture et secondarily breeding	5-25

**Table 2: Distribution of the average herd size per species by breeding system in Grand Kanem (Chad)**

Species	Nomadic herders	Transhumant agro-herders	Sedentary agro-herders
Cattle	63 <sup>a</sup>	34 <sup>b</sup>	10 <sup>c</sup>
Camels	45 <sup>b</sup>	51 <sup>a</sup>	7 <sup>c</sup>
Sheeps/goats	10 <sup>a</sup>	9 <sup>a</sup>	15 <sup>a</sup>

Values in the same line followed by the letters a, b c, are significantly different

**Table 3: Characteristics of the different farming systems in the Grand Kanem (Chad)**

Paramètres	Nomadic herding	Transhumant agro-herding	Sedentary agro-herding
Family size	7	9	15
Cattle population (TLU)	47,6	26,1	9
TLU/person	6,8	2,9	0,6

1 Cattle = 0.75 TLU; 1 Sheep or goat = 0.1 TLU

**Table 4: Percentage of responses in relation to the changing number of livestock species in the Grand Kanem (Chad)**

Criteria	Cattle	Sheep	Goats	Camel
Growth	16	24	13	20
Decline	51	38	22	20
Stagnation	33	38	65	60
Total	100	100	100	100

system in the region (51% of breeders). It mainly involves cattle and small ruminants herders namely the Kreda, Arabs and Fulani Khozam Waila. They make seasonal migrations to areas of Hadjer-Lamis, Chari-Baguirmi and southwest shores of Lake Chad.

### Nomadic herding

This farming system is distinguished from the others by the nature of seasonal mobility, the shape of the habitat and the lack of agricultural activities. In Kanem, it takes two forms: (i) there are those who are continually moving within the region with the whole family and all their animals in search of water and pasture but also to avoid conflicts. This is the example of inter-well movements undertaken by northeast Kanem camel owners referred to as "wells or pasture nomadism" (Barraud et al., 1997); (ii) others as the Oudah Fulani and the Ouled Rachid Arabs herders migrates seasonally along a north-South axis. The herders move between northern and southern Kanem in Chad or to the Central African Republic. As for the

latter, they do travel between the Kanem and the transitory zone between the Sahel and the savannah south of N'Djamena. These groups are called major transhumant in relation to the magnitude of their annual trips reaching or exceeding sometimes 1500 km. Nomadic herding is practiced by more than 28% of herders in the region including the Oudah Fulani herders and the Oualad Rachid Arab camel owners.

### Livestock and evolution

#### Average size of herds by species and farming system

The average size of a cattle or camel herd varied significantly from one breeding system to another. The number of cattle and camels were significantly higher ( $P < 0.05$ ) among nomadic herders and transhumant agro-herders (Table 2). The number of small ruminants, however, shows little change from one system to another.

#### Breakdown by class type

A class distribution according to size showed that more than half of nomadic herders and transhumant agro-herders held between 40 and 80 heads of cattle (Fig. 2). The size of more than 80 heads of cattle was found only among the nomadic herders. The majority of livestock herders (85%) had a cattle size between 1 and 20 headcounts.

#### Distribution TLU / person

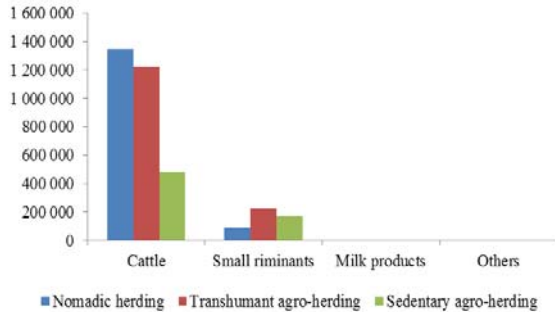
The relationship between herd size (all species) and the size of the family highlighted in a number of pastoralists TLU/person, twice as high as for transhumant agro-herders and six times more than in sedentary agro-herders (Table 3).

#### Evolution of livestock

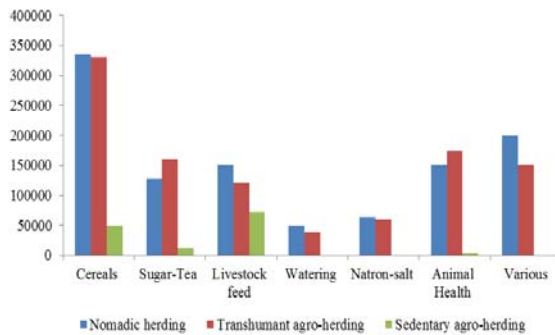
The evolution of herds of different species has been variously valued by sedentary agro-herders. For half of them, the number of cattle has been declining over the past ten years (Table 4). One third of herders feel the same way for sheep. The numbers of goats and camels have not changed significantly. Camels and goats are better adapted to environmental conditions dominated by woody shrubs.

#### Economic situations of farms

Revenues came mainly from sedentary herders selling animals. Large livestock (cattle and camels) was more sold by nomadic herders followed by transhumant agro-herders (Fig. 3). As for small ruminants, they have



**Fig. 3: The main sources of income according to the system in the Grand Kanem (Chad)**



**Fig. 4: The major sources of expenditure according to the system in the Grand Kanem (Chad)**

been the subject of a larger operation in the transhumant agro-herders and sedentary agro-herders. Other productions from the herd (dairy products, hides and skins) accounted for only a small share of revenues.

The strategies developed by herders in terms of expenditure (Fig. 4) tended to mainly ensure their survival, maintenance and reproduction of the herd.

Grain purchase represented the largest item of expenditure among pastoralists and transhumant agro-herders followed by sugar and tea and animal health care. Among sedentary herders buying cattle food was by far the largest source of expenditure. However, they spent less money for the health of their livestock. Expenditure on livestock watering and salt or soda purchase is carried out only by nomadic herders and transhumant agro-herders.

## Discussion

Pastoral communities of the Grand Kanem have lifestyles and the best know-how to adapt to the Saharo-sahelian environment and to survive in this space. This ability to adapt has been a valuable asset for herders to feed their families and supply their countries and neighbouring Southern and Northern countries with meat. However, the resilience of the pastoral societies

are tested by recurrent climatic shocks with their economic, social, political and environmental consequences (Wiese et al., 2008; Grimaud, 2009; Bonnet, 2013; Bonnet and Guibert, 2014).

The distribution of herd size by rearing system showed that the number of livestock varies depending on the degree of mobility of herds. The numbers of animals in herds were greater in nomadic herders than in transhumant and sedentary agro-herders. This observation allows us to say that only pastoral systems based on a seasonal or permanent mobility prove economically viable and environmentally suitable for a sustainable development of fragile and sparse grazing resources in arid and semi-arid areas. On the contrary, the low mobility observed in other systems is explained by the association in the same unit agricultural production and pastoral activities. This practice often results in a reduction in herd mobility and is a major constraint to the viability of these systems, which usually have low resilience. A comparative monitoring of herds in the Sahel region of Niger showed that the productivity of mobile herds was 20% higher than the sedentary herds (Colin de Verdière, 1995).

The herd and family size ratio is an illustration of the ability of a household in pastoral areas to survive and grow in the arid environment. Pastoral mobility would require a small family size inversely proportional to the herd. Similar situations have been reported by several authors (Landais, 1983; Boutrais 1992). Thus, to save the pastoral life, households must maintain a balance between the size of their herds and family labour (Thebaud, 2002). Speaking of Johyas pastoral herders of Rajasthan, Saurabh (1996) indicates that they have intrinsic mechanisms to maintain a small population, in relation to the size of livestock. It is through social institutions that pastoral herders are able to adjust the demographic process: delay in marriage among boys, separation of couples during transhumance, etc. Banzhaf (2005) indicates that in the pastoral life, there is a threshold (minimum living or sustainability threshold) below which the domestic unit can no longer live entirely on animal husbandry. This notion of "survival" includes daily needs, as well as risk coverage, including droughts, epidemics or unsafe situations (Guibert et al., 2009). Several authors argue that a vital minimum of about 5-10 units Tropical Cattle (TLU) per person (Bonfiglioli, 1991); 28 dairy cows are needed in Fula environment to meet the needs of a medium size family of 6 to 7 people (Fabrègues, 1984) and three active-UBT for the Niger and Burkinabe Sahel (Thebaud, 2002). When the herd size falls below this threshold, the strategies implemented by herders consist of moving towards the practice of food crops to avoid a heavy drain on livestock, the exodus to the city and selling the labour force of some family members. However, beyond this threshold, the family labour force

is no longer able longer able to manage the herd. In this case, the family can either use external labour or put some animals in fostering. For “pure” pastoral systems (without farming), the maximum threshold would be between 50-80 UBT, based on the size of the household and fodder availability (Bonfiglioli, 1991). In agro-pastoral systems, it is significantly less, depending on the variety of economic activities by domestic units. This source estimates that about 10 UBT per average household of 6 to 7 people.

Economic performance relative to revenues show that the practice of both agriculture and livestock in agro-farming and agro pastoral systems helps to diversify their income sources to sustain themselves and meet their needs. On the contrary, in the nomadic pastoral system, where agricultural practice does not exist, revenue is derived almost exclusively from the sale of animal products (cattle, milk, leather and skins, dried meat). Agro- sedentary herders and transhumant agro-herders save on cereals, which allow them to invest more in buying food. Monetary incomes of the two activities complement throughout the annual cycle.

It appears from the economic results on expenses that sedentary lifestyle creates many other needs in agro herders and transhumant agro- herders that have increased their charges. The result was a gradual de-capitalization of their stock, despite a greater investment in the purchase of cattle food. According to Réounodji (2003), this capitalization is a voluntary destocking of animals to improve the agricultural system. Yet it is lived by these transhumant agro-herders forced to settle to mark their space in front of the expansion of agricultural land, as a drama, “We are forced to sell a significant number of animals not to feed our family as before, but mostly to save our lives”. They are alluding to arbitrary imprisonments, kidnappings of children, payment of disproportionate fines, etc. But among pastoralists, buying grain is the main expense. The use of agricultural products is an absolute necessity for this group, and links directly to local markets. The lifestyle of these herders does not allow them to stockpile grain when prices are low. In most cases, the terms of trade for livestock/grain are unfavourable to them. According to some authors (Ancey and Monas, 2005; Grimaud, 2009), at the time of crisis, when the herders are unable to feed livestock and soaring grain prices force them to “destocking” and increase abnormally their commercial exploitation rate.

### Conclusion

The study showed that pastoral systems are well suited to the arid environment of the Grand Kanem. This adaptability is related to resilience of pastoral societies for decades subject to recurrent droughts and socio-political unrest. They have developed over time resilience that enables them to survive in that at risk

environment which is the Sahel. Despite the many challenges they face, pastoral systems still remain uniquely able to enhance the pastoral resources of arid and semi-arid areas, thus contributing to the improvement of food supply and security of the poor people depending on livestock. The increase in demand for animal products brought on by the general population increase and urban growth in particular offers opportunities to improve the livelihoods of the poor, many of whom are herders. For this, assistance measures are needed to secure pastoral systems (food Bank, prophylaxis campaign, stock watering, etc.) and allow them access to markets.

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