

Objectives and Practices of Village Rearing Small Ruminants in Nankesse in the Province Of Logone Oriental in Southern Chad

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Abstract

The study aimed to determine the objectives and practices of village rearing small ruminants in Nankesse in the Province of Logone Oriental. Surveys were conducted from March 4 to March 21, 2019, among 130 heads of households of both sexes breeding small ruminants in the study area. Data on the profiles of breeders, herd size, ownership of small ruminants, origin of animals and breeding objectives, type of habitats used, feeding management of small ruminants, breeding practices, veterinary care, diseases, and other constraints were collected and analyzed with XLSTAT software (6.1.9). The results showed that 93% of respondents were educated, all were married, and women owners represented 18%. The respondents were mostly agro-breeders rather than breeders. The average size of the livestock per household was 20 small ruminants. Most households do not have habitats for animals, but they all supplement with artisanal bran. All breeders ensured the health monitoring of their herd themselves. This study reveals that households mainly raise small ruminants in the Nankesse canton for sale and self-consumption. The production system remains traditionally extensive, with food supplements and veterinary care not involving professionals. However, productivity was encouraging despite a significant loss due to the lack of shelters for the animals. To supervise breeders to improve the production of their animals, the veterinary service must conduct awareness campaigns on the importance of veterinary care by professionals, feeding practices, and shelters in animal production. Small ruminants in the study area are raised in a traditional extensive system, mainly for self-consumption and sale. Further studies on animals in improved breeding conditions are necessary to improve and better assess the productive performances of small ruminants in the study area.

Keywords: Chad, Livestock Nankesse, Practice, Logone Oriental, Small Ruminants.

Introduction

Small ruminants are the highest ruminants in the tropics and Sahelian areas because of their functions: food (milk and meat), social (marriage and various festivals), economic (income from sales) and cultural (various rituals and sacrifices) (Souleyman *et al.*, 2020; Alary *et al.*, 2015). Livestock farmers use these species to meet the daily cash flow and meat protein consumption needs of households, but also to replenish herds (Alexandre *et al.*, 2012; Gnanda *et al.*, 2016). Small ruminants number more than 50 million head in Chad, including 30,519,349 goats and 26,436,170 sheep (MERA, 2015). An extensive traditional livestock farming system dominates small ruminant farming in Chad, with a very limited and varied level of inputs across the three major ecological zones (Saharan, Sahelian and Sudanian) (Lancelot and Lesnoff, 2018). Goat and sheep species adapt to the specific conditions of agro-ecological livestock zones by following small ruminants' regions and farming methods (Abdilatif *et al.*, 2018). Each of these management methods is adopted according to feed resources (fodder and water). Zootechnical performance is affected by the type of breeding management: birth weight, live weight, carcass yield, litter size, reproductive ability and efficiency (Mopaté *et al.*, 2019). Although rare, the organization of the small ruminant herd in goats has been studied in Guera (Mopaté *et al.*, 2014). Farmers favour this structure to plan the exit of animals from the herd. In Africa, goat live weight forecasting has been a valid strategy to improve livestock market management for rural producers (Chinchilla-Vargas *et al.*, 2018).

The overall high mortality rate for small ruminants varies between 29% and 35% (Dumas, 1980; Lancelot *et al.*, 1994). It is higher in young people aged 0 to 1 year (41%). It is essential to know the production method and the roles of small ruminants to organise their rearing. The objective of this study was to determine the objectives and practices of small ruminant breeding in Nankesse in the Province of Logone Oriental in order to understand better the mode of livestock management and the objectives of small ruminant breeding and finally to identify the constraints to the production of small ruminant breeding in Nankessé.

Materials and Methods

Description of the Study Area

The study was conducted in the Nankessé canton, located northwest of Doba city in the province of Logone Oriental on the Lai city axis. Nankesse is located about 5 km from Doba. The province of Logone Oriental is located in the south of Chad and has an area of 28,035 km². It is bordered to the north by the Tandjilé, to the south by the Central African Republic, to the east by the province of Mandoul and to the west by the Logone Occidental. The climate is humid tropical with an extended rainy season from April to October. The average annual rainfall is between 1,000 and 1,300 mm. From November to March, the dry season is characterized by high temperatures in March. The thermal oscillating amplitude is 10°C. Tropical ferrallitic and ferruginous soils are dominant, but hydromorphic soils are common throughout the rivers. These lands are favourable to cultivation. The vegetation is characterized by wooded savannah and open forest with a multitude of species such as: shea butter (*Butyrospermum parke*), locust (*Parkia bigbosa*), caïcedrat (*Khaya sénégaleensis*), Baobab (*Adansonia digitato*), tamarind (*Tamarindus indica*), Accasia .

Sampling and Data Collection Methods

A single-pass questionnaire was used to survey 130 households raising small ruminants in the Nankesse canton from March 4 to March 21, 2019. Meetings with the heads of departments, the head of the Nankesse canton, the village chiefs and the breeders made it possible to obtain the data sought. Breeder profiles, herd size, small ruminant ownership, animal origin and breeding objectives, type of habitats used, feeding management of small ruminants in Nankesse in Logone Oriental.

Data Analysis

The information collected concerned the respondents' socio-economic data (age, main socio-economic activities, family size, livestock, livestock composition), livestock management (feeding, health, type of habitat and constraints), livestock objectives, source of income and main uses of the income from the sale of animal products. The information collected was processed with the XLSTAT software (6.1.9). The dispersion parameters (mean \pm standard deviation, extremes and frequencies) and the analysis of variance (ANOVA) were obtained with the

Newman-keuls test at 5%.

Results and Discussion

Results

Socio-Professional Characteristics of the Respondents

Breeders surveyed were of both sexes, Muslim or Christian, with a level of education ranging from illiterate to higher education, and their main activities were agriculture and livestock farming (Table 4).

Table 4: Socio-religious profile and main activities of the households surveyed

Parameter	Variable	Number (n)	Proportion (%)
Sex	Female	23	17.69
	Male	107	82.31
Religion	Christian	124	93.38
	Muslim	6	4.62
Education	Illiterate	9	7.09
	Educated	121	92.91
Educational Level	Primary	74	61.16
	Secondary	44	36.36
	Higher	3	2.48
Main Activities	Agriculture	124	95.38
	Breeding	6	4.62

The majority of the surveyed herders were men rather than women, Christians rather than Muslims, educated to the primary level, followed by the secondary level, and lower for the uneducated and those of higher level ($p < 0.05$).

The herders in the study area were all married to at least one woman. The number of children and workers, as well as their age and experience in pastoral activity, are presented in Table 5.

Table 5: Characteristics of the households surveyed

Parameter	Minimum	Mean \pm Standard Deviation	Maximum
Age (year)	20.00	40.73 \pm 1.12	75.00
Number of wives (n)	1.00	1.53 \pm 0.08	5.00
Number of children (n)	1.00	11.04 \pm 0.66	50.00
Number of workers (n)	2.00	6.08 \pm 0.45	39.00
Experience of breeders	1.00	17.31 \pm 1.34	63.00

The majority of respondents were men (82.31%) and women, aged about 40 years, married to at least one woman and with 17 years of experience in raising small ruminants (1 - 63). Breeding small ruminants in the study area is a man's responsibility, but women are beginning to take an interest in it. Small ruminants are reared by a fairly young population. This is consistent with the low purchase price, which is easy for young people to access. The presence of small ruminants in a household is necessary because all farmers are married and have more than 15 years of experience in livestock farming than the average age of the respondents. The predominance of Christians (93.38%) over Muslims (4.62%) testifies to the Christian nature of the indigenous population of the study area. Manjieli *et al.* (1994) reported an observation in Cameroon that was not very different.

Regarding the respondents' education, more than 90% were educated against an illiterate minority (7.09%). The majority of the educated respondents had a primary school (57.48%), against a minority of secondary school (33.86%). This level of education could be beneficial for the technical training of livestock farmers and for good

monitoring of herds. Most of the respondents were agro-pastoralists. This shows that agriculture in Chad is still linked to livestock and that few households are exclusively herders without agriculture. As a result, even transhumant herders do subsistence farming. This observation agrees with those reported in Mali by Killanga and Traoré (1999) and in Cameroon by Manjeli *et al.* (1994).

Households have an average of 20.32 ± 1.79 heads of small ruminants (1-122) including $13.87 \pm$ goats and $15.18 \pm$ sheep. This average is slightly greater than 18 heads of goats per households reported in Togo (Djagba *et al.*, 2020). The average heap of livestock was 20 heads of small ruminants per household, which varied from 1-122 heads.

Origin and Ownership of Small Ruminants

Most animals are acquired by purchase, but a small portion of breeders acquire them through other means (Figure 2).

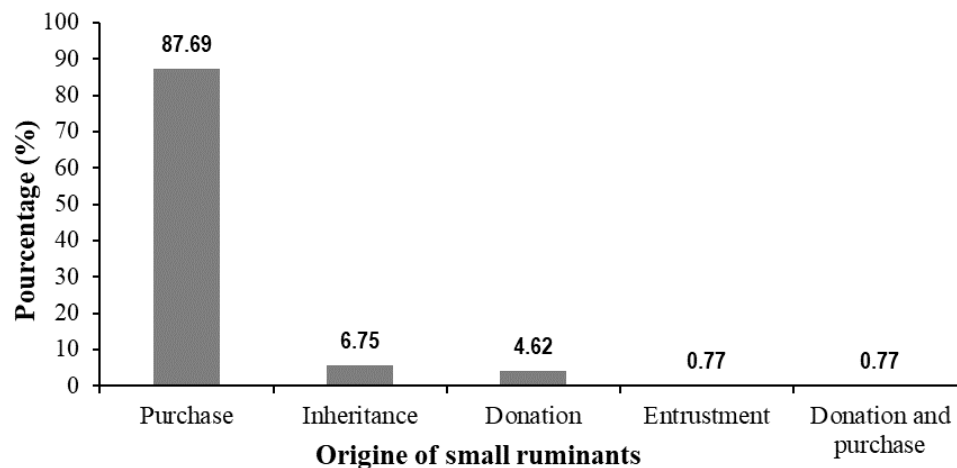


Figure 2: Modes of acquisition of small ruminants in the Nankessé canton

Small ruminants are acquired mainly by purchase at local markets. The nature of the ownership of small ruminants was mainly individual (96.90%) and the proportion of collective herds was very low (3.10%). This difference was significant ($p < 0.05$). The results of the study carried out in the urban and peri-urban areas of Abéché (Chad) do not differ much, because 65% of Kababish sheep are acquired by purchase (Souleyman *et al.*, 2020). The inheritance and donation are the main ways of acquiring sheep, unlike that reported in Cameroon (Yaye-Abdou *et al.*, 2019). Donations, purchases, entrusting, barter, dowry and inheritance are important for small ruminants (Tendonkeng *et al.*, 2013). Which also differs from the results of this study.

Objectives of Small Ruminant Breeding

All breeders produce for sale and consumption. The average annual output of all species combined was 12 ± 1.43 small ruminants per household, and the details on the different forms of output are presented in Table 7.

Table 7: Average annual output of small ruminants per household

Parameter	Minimum	Mean \pm Standard Deviation	Maximum
Number of animals sold (n)	1.00	$4,55 \pm 0.42^{ab}$	25.00
Number of animals consumed (n)	1.00	$2,27 \pm 0.24^b$	24.00
Number of physical lost animals (n)	1.00	$6,27 \pm 0.77^a$	51.00
Number of animals leaving the herd (N)	3.00	12 ± 1.43	100.00

Different letters on the means in the same column indicate a significant difference between these means ($p < 0.05$).

Animal losses were the main reason for removing small ruminants in households. The sale of animals and consumption following these physical losses of animals represented the lowest frequency of removal of small

ruminants in households ($p < 0.05$). About 5 animals sold per year at USD 24.67 each on average corresponds to USD 123.36 in income. The funds from this sale were used for: purchase of millet, schooling, care, and purchase of cattle (Figure 4).

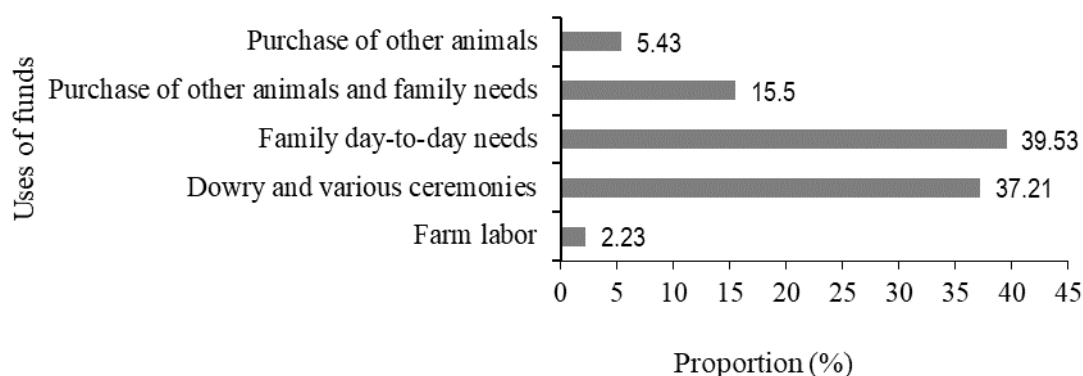


Figure 4: Different uses of funds from the sale of small ruminants in Nankessé

The breeding of small ruminants in the study area is intended for marketing and self-consumption. The objective of this breeding is not very different from the results of Odjigué *et al.* (2022), who reported in the Tandjilé (province near the study area) that young are raised for social assistance in addition to sale and self-consumption. Apart from these goals, Challaton *et al.* (2022) report that the little ones are raised mainly for savings and socio-cultural reasons in Benin. However, the results of the study by Tchouamo *et al.* (2005) in Cameroon differ in the sense that small ruminants are raised only for sale or reproduction (Yaye-Abdou *et al.*, 2019), but in Burkina Faso, it is preferable to raise goats to get cattle (Gnanda *et al.*, 2016). In addition to marketing, small ruminants are raised in Africa for various sacrifices and dowry (Alexandre *et al.*, 2012; Gnanda *et al.*, 2016). This breeding thus constitutes a guarantee of food and social security. Mobilizing small ruminants makes it easier to meet the daily needs of rural households (Manjieli *et al.*, 1994). Due to their availability for the most fragile layers (women and children), they guarantee food security, improve the family economy and decrease vulnerability to rural populations (Tchouamo, 1998; Jansen, 2004; Tendonkeng *et al.*, 2013; Alary *et al.*, 2015). Although the breeding objective in the study area was sale and consumption, losses have represented an important part in this study for households. This strong loss is due to the low level of breeding driving, and generally, animals are in permanent rambling or without shelters.

Small Ruminants Breeding Management in the Province of Logone Oriental

Natural pasture was the basis of the diet of small ruminants for all breeders in the study area. This is in accordance with the observations made by Lancelot and Lesnoff (2018) which indicate that in the Sahel, the breeding of ruminants is dependent on the availability of natural grazing. All of these breeders supplement their animals with various supplements (Figure 5) and the average annual expenditure per household amounts to USD 10.05.

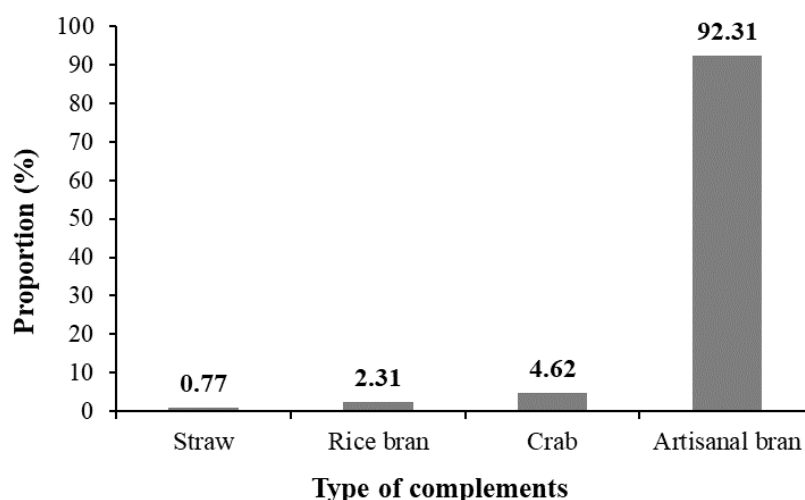


Figure 5: Use Degree of different supplements in small ruminant breeding in Nankesse

The most used supplement in small ruminants breeding in the Province of Logone Oriental and specifically in Nankesse was artisanal bran and the least used were all other types of supplements. However, these breeders complement their small ruminants with various supplements, the main one being the craft sound. The availability of this by-product justifies this. This result was in accordance with other studies (Mopaté *et al.*, 1998; Subomano, 1998; Tendonkeng *et al.*, 2013; Yaye-Abdou *et al.*, 2019).

Free mating was the only mode of reproduction, and male breeders are selected from the herds based on rapid growth performance (100%). The reproduction parameters in the study area were described in Table 8.

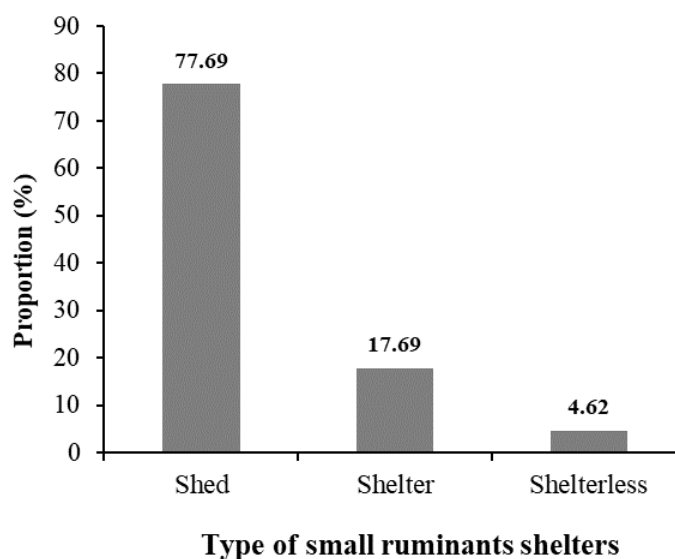
Table 8: Efficiency of small ruminant reproduction in Nankessé

Breed	Interval between lambings (months)	Size of litter (n)	Nombre weaned kids (n)
Goat	7.14 ± 0.21 (7-20) ^a	2.18 ± 0.05 (1-4) ^a	4.14 ± 0.24 (1-12) ^a
Sheep	7.23 ± 0.26 (7-18) ^a	2.14 ± 0.07 (1-4) ^a	3.98 ± 0.37 (1-15) ^a

Identical letters on the means in the same column indicate that there is no significant difference between these means ($p > 0.05$).

The reproductive performance of small ruminants in the Nankessé canton is satisfactory for both breeds ($p > 0.05$). The free mount has been the only reproductive mode in terms of reproduction mode. However, male breeders are all chosen from herds on their best growth performance. This animal reproduction mode reflects the extensive traditional character of the farming in the study area. However, in neighboring Cameroon, in semi-intensive farms, directed reproduction is requested and the parents are selected on their aptitude for meat production (Manjieli *et al.*, 1996). This difference could be explained by driving modes and breeding conditions for small ruminants.

All the households surveyed say they follow their herd of small ruminants themselves. Three types of small ruminant habitats were reported in the study area (Figure 6).

**Figure 6:** Different shelters of small ruminants in Nankesse

The majority of breeders shelter their animals in sheds, followed by those in animal pens and others in permanent wandering (without shelter). The habitat of small ruminants in the study area is traditional. Most breeders keep their small ruminants in hangars, and few have installed animal huts. This well illustrates the traditional character and the extent of this breeding in the study area. The same type of habitats is reported in Benin (Wasso *et al.*, 2018; Challaton *et al.*, 2022).

All of the breeders have assured themselves of the health monitoring of their herds. Because of the technical non-qualification of breeders, there was an important impact of diseases in the herds. So, the treatments have been

unsuitable with products of dubious origin. These treatments administered by non-professionals could create resistance to treatment in animals. The 100% health monitoring rate carried out by the breeders themselves is higher than that of 64% carried out by a technician working in the herds of goats in Togo (Djagba *et al.*, 2020).

Constraints on Small Ruminant Rearing in the Logone Oriental

The main constraints on small ruminant rearing were: disease, theft, predation and straying (Figure 7).

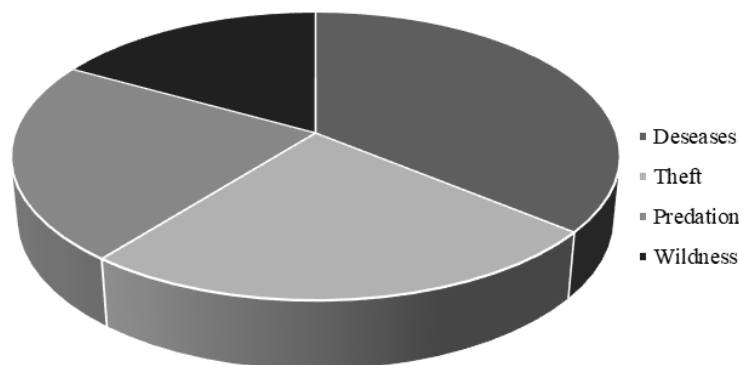


Figure 7: Constraints on small ruminant rearing in Nankessé

The main difficulties encountered include illnesses, theft, and predation. Due to this, the number of outings of the small ruminants of family herds increases. Habitat and lack of technical supervision are justified by this observation in the production system of small ruminants in the studied area. The results of Cameroon are not very different (Tchoumboué, 1997). In addition to these constraints, there is the lack of technical supervision (Figure 8).

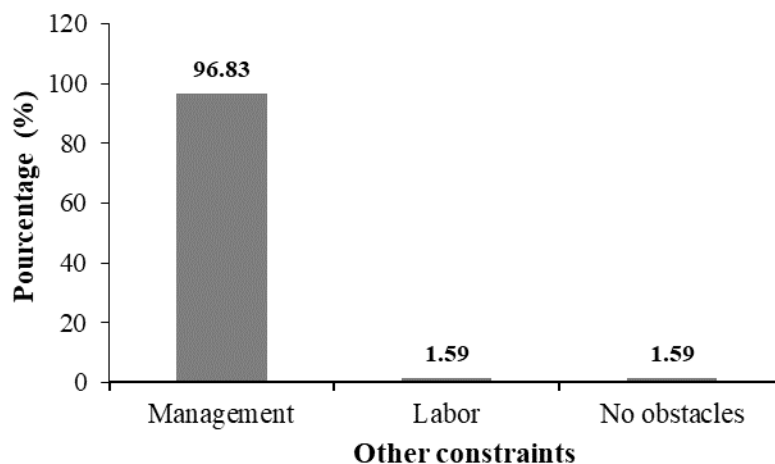


Figure 8: Other obstacles to the rearing of small ruminants in Nankesse

Households in the study area do not systematically provide the same summary habitat for small ruminants, which exposes them to constraints.

Conclusions

A survey on production and socio-economic use of small ruminants in Nankesse in the province of Logone Oriental determined these species' farming objectives and practices. In the study area, small ruminants are bred mainly by educated and married men. Breeders take care of veterinary care and summary shelters for animals, which maintains the traditional production system. Despite the persistent difficulties (diseases, theft, predation, and error) linked to the lack of shelters, the productivity of small ruminants is satisfactory. They are mainly raised for self-consumption and sale. The background from the sale of animals is used to face the daily cash needs and to reconstruct herds. In order to supervise breeders to improve the productivity of their animals, the veterinary service must carry out

awareness campaigns on the importance of veterinary care by professionals, eating practices, and shelters in animal production. The small ruminants of the study area are raised in a traditional extensive system, which is essentially for self-consumption and sale. Additional studies on animals under improved breeding conditions are necessary to improve and better assess the productive performance of small ruminants in the study area.

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Contribution by Authors

All the authors contributed equally to writing the manuscript. The final manuscript was read by all authors and consented to publication.

Conflict of Interests

There is no conflict of interest.

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