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Zoo technical Characteristics of Breeders and Some Grasses Forages Used in Small Ruminants Feeding in Sahelian Zone, Ati Division-Chad

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ABSTRACT

A survey of socio-technical characteristics of small ruminant's production was carried out in Ati division within the region of Batha in Tchad, from August to September 2018. Data were collected from 100 livestock producers within the urban community of Ati (UCA), using a structured questionnaire. Information on socioeconomic (breeder's ethnic group, age, marital status, education level, number of children, reasons for rearing goats and sheep, labor distribution etc.), technical characteristics (herd size and composition, feeds and feeding practices etc.) and phytosociological investigation of small ruminant's breeders were focused. The result obtains from this study show that Arabic (26%) ethnic groups were the major breeders, followed by the Fulani or Peulh (25%) ethnic groups. The farmers (43%) who were all Muslim (100%), were aged between 20 and 40 years and were almost married (92%). Their educational level was limited to primary (21%) and secondary school (10%), with few famers having high level of education (2%). Self-consumption of milk and wealth accumulation through the trade of animals and its products were the main reasons for ruminants breeding. The herds of animals were mostly led in group (75, 58%) to the pasture, using familial (82%) or paid (17%) labor. The herd average size which was 58 animals, were mainly constituted by goats (32%) and mixed herd comprising goats and sheep (25%). The annual income was ranged between 50 000 and 200 000 FCFA. The Bokaro were used as the means of housing herd in the community of Ati. Feeds scarcity and lack of health care and transport were the main challenges of small ruminants breeding. It has been noticed that, feeds from the pasture were made up of grasses that are often insufficient for animal nutrition. The main grasses registered were Cenchrus biflorus (81.34%), Echinocloa colona (81.32%), Schoenefeldia gracilis (64.41%), Setaria verticill at (50%), Echinocloa sp (29%), Brachiaria deflexa (31.15%), Dactyloctenium aegyptium (14.62%) and Eragrostis tremula (10.65%). During the dry season grasses fed to animals were complemented with by-products like cow pea hays (23%, agro-industrial by-product (22%) like leguminous cakes, the kitchen waste (17%), minerals (28%) and even grass and browse fodder (10%). Technical training over animal nutrition and health which was solicited by the farmers can enhance the rational utilization of existing feeds to increase animal breeding in the community of Ati.

Keywords: *Zootechnical characteristics, forages, small ruminants, feeding, Sahel.*

INTRODUCTION

The Sahel is an excellent ruminant breeding area, with a feeding system based on the exploitation of unproductive natural pastures (Pamo et al., 2010, Béchir and Mopaté, 2015, MERA, 2016). Pasture forages biomass are mainly made up of low annual grasses (300-1500 kg/ha/year) (Westbrooke et al., 2005; MERA, 2008). The nutritive values of these forages are only high at the beginning of the rainy season, and deteriorate with the progress of the season (Pamo et al., 2001; Pamo et al., 2010). The animals are confronted with problems of quantitative and qualitative insufficiency of feeds in the dry season, with enough losses of animals; this situation is a major handicap for the development of pastoralists and the economy of the populations of the region (Pamo et al., 2008; Soumana et al., 2016). Indeed, food insecurity and malnutrition of the Sahelian populations seem to be due to climate conditions and low crop production (Béchir and Mopaté, 2015). Moreover, the growing encroachment on grazing areas,

population growth, urbanization, farm mechanization and the development of insecurity (armed robbery, boko haram etc.) in remote areas are as much realities faced by pastoralists (APESS, 2013). These conditions influence forages availability leading to massive displacement of pastoralists and their herds searching feeds and water in the southern part of the country (MERA, 2014). However, the movement of pastoralists generates increasing conflicts between farmer-breeders with many cases of deaths of men (Haessler et al., 2002; Sougnabe, 2009; MERA, 2014).

Modern animal husbandry systems, based on permanent confinement or semi-confinement with rational feeding system of animals, is an appropriate solution in animal production (APESS, 2013). The pastoralism which is a means of exploiting the vegetation in Sahel region seems to be hampered by cross-border insecurity. To increase forage biomass and ensuring sustainable exploitation of herbaceous strata, the information on different grass species that make up the forages stand, as well as their dominance in the rangelands, seems to be appropriate to promote animal husbandry.

To enhance a dynamic modern animal husbandry, it should be better to know the breeder's feeding practices and different feeds used, in order to set up an improvement program whose objective is to increase the productivity and competitiveness of animal products in Sahel region. The study of forage grass dynamics is one of the alternatives to boost animal production in these areas (Soumana et al., 2016). Though, Graminaes have a great strength of adaptation to environmental conditions (Sampoux, 2013; Hiernaux, 2015), because of its particular physiology (plants that produce 4 carbon atoms during photosynthesis), with a low nutritional value due to early soil drying, and their biomass varies with time and space according to the level of rainfall (Hiernaux, 2015). The general objective of this study is to analyze the social and technical characteristic of feeds use and the management of livestock farming and identify the forage grasses of the rangelands, so as to improve animal nutrition in the arid region of the municipality of Ati.

MATERIAL AND METHODS

Study Area

The study was conducted between August and October 2018 in the urban community of Ati (CUA) in Batha province, Batha-West department, Chad. This municipality is composed of an urban area and the surrounding areas. The urban area is a large urban agglomeration with several neighborhoods. The surrounding area includes all villages administratively linked to the municipality and which are located less than 15 km around the city of Ati. This town is located in the center of the country. It extends between the 12th and the 16th parallel north with an area of 88800 km2, the rainy season runs from June to September and the dry season extends from October to May. Temperatures range from 14 to 42°C. Its relief is slightly uneven with temporary streams of water. The soils are sandy and compact clay-loamy in the north. They are large dune silts and trays with closed depressions or "ouadis" sometimes very close, with vegetation of the Sahelian type (Bechir and Mopaté, 2015).

DATA COLLECTIONS

Methods of Survey

Data collection relied on retrospective survey methods developed by the International Livestock Research Institute (ILRI) for the systematic estimation of demographic parameters (Mamadou et al., 2017). A total of hundred (100) farmers randomly chosen in the twelve (12) quarters and five villages of the UCA were investigated. The data collection was based on the socio-economic characteristics of pastoralists: ethnicity involved in livestock, age, sex, family size, religion, level of education, main activity, experience in livestock, and nature of farming. The use of labor, the acquisition of breeding stock, the choice of species, the reason for the choice and the species constituting the herd was also concerned. In terms of husbandry practices, the characteristics sought were related to livestock management: composition of the herd, housing of animals, the main forages used and the types of feed supplements and herd management at pasture (Kadi et al., 2016).The economic aspect concerned the objective of animal breeding, and the inflow and outflow of income over the year, the constraints and speculations of the farmer (Tendonkeng et al., 2013). This interview-based study was conducted through visits during which the flock was on site (Lesnoff, 2011).

Identification of Grasses Forages

The phytosociologic investigation of small ruminant's breeders was carried in the

community of Ati using questionnaires. The information required was the husbandry practices in UCA. The questionnaires were distributed according to orientation of the local veterinary officers. Only farmers that have at least three animals were concerned. A total of hundred (100) farmers randomly chosen in the twelve (12) quarters and five villages of the UCA were investigated. The aim was to know the main forages species that are commonly used by the livestock breeders, in such a way those strategies for the improvement of animal feeding should seek out.

Statistical Analysis

The collected data were compiled; coded and descriptive statistics were performed between the variables using SPSS 20.0 software. The proportions of the results were reported in percentage.

Results

Social Characteristics of Pastoralists

The social characteristics of small ruminant breeders of urban community of Ati (UCA) are presented in Table 1. From this table, it appears that breeders were generally married (92%). The distribution of producers by size of household showed that most of the families surveyed (44%) had at least four (4) children, and 36% of families had the family size of 6 to 10 children. Men were more involved (68%) in raising small ruminants than women (32%) in UCA. The Arabs were the dominant ethnic group (26%) of small ruminants, followed by Fulbe or Peuhl (25%) who were mostly in the surrounding villages of Ati. Then came the Kouka (16%) and Bilala (15%) ethnic groups, followed by other ethnic groups that were poorly represented. These breeders seemed to be getting married very early without educational base. The majority of breeders (43%) were aged between 20 and 40 and others (42%) are having about 41 to 60 years old. In fact, only 34% of herders were in school and 67% had not received a formal education. Only 21% of herders had a primary education level, 10% had reached the secondary level and only 2% have attempted high school (Table 1). All the breeders surveyed were Muslim (100%). It was found that animal producers were either agro-pastoralists (36%) or exclusively pastoralists (34%). However, a few of them are involved in trade (7%) and artisanal (1%) activities; some breeders (22%) are engaged in variable temporary jobs.

Table1. *Social characteristics of small ruminant farmers in the urban community of Ati*

Characteristics (n = 100)	Percentage
Ethnic group	
Arabs	26
Foulbe	25
Kouka	16
Bilala	15
Ouadaien	3
Borno	3
Djatné	2
Walad	2
Others	8
Age ranges	
< 20 years	6
20 - 40 years	43
41 – 60 year	42
> 60 years	9
Marital statute	
Maried	92
Singles	6
widows	2
Number of children	
1 à 5	44
6 à 10	36
11 à 15	8
16 à 20	0
>21	1
Without children	11
Level of education	
No formal education	67
Primary school	21
Secondary school	10
High school	2
Main activities	
Animal breeder	34
Agro-pastoralist	36
Trader	7
Others activities	22

Zootechnical Characteristics of the Breeders Constitution of the Flock or Herd and Professional Experience

The technical characteristics of small ruminants breeding in the municipality of Ati are presented in Table 2.The choice of the animal species to be reared seems to be related to the practical experience on the knowledge of the environment and the vigor of the animal. For herders aged less than 20 years, single species herds outnumbered those of several species. It has been found that 50% of the herds were goats and 33.33 were sheep. The mixed herds constituted of goats-sheep (16.66%) were registered. For those aged between 20 and 40 years, herds were mostly goats (46.51%), followed by mixed herd made up of sheep and

goats (23.25%). In addition to small ruminants, some breeders have herds that contain cattle-sheep and goats (13.95%); while others had only a herd of sheep (11.62%), a flock of goats (9.30%) and cattle (4.65%).

Table2. *Zootechnical characteristics and experience of small ruminant's breeders in urban community of Ati*

	Animal Species	Breeders	Population	Pourcentage
Age range				
< 20 year (n=6)	Goats	3	22	50
	Sheep	2	54	33.33
	goat-sheep	1	134	16.66
	Cattle-goat-sheep	1	20	16.66
20- 40 year (n= 43)	Goats	20	350	46.51
	Sheep	5	262	11.62
	Goat-sheep	10	632	23.25
	Cattle	2	163	4.65
	Cattle-goat -sheep	6	240	13.95
41 - 60 year (n= 43)	Goats	12	503	27.90
	Sheep	4	344	9.30
	Goat-sheep	17	1074	39.53
	Cattle	5	192	11.62
	Cattle-goat -sheep	5	250	11.62
> 61 year (n= 8)	Goats	1	146	12.5
	Sheep	1	92	12.5
	Goat-sheep	3	189	62.5
	Cattle	1	103	12.5
	Cattle-goat -sheep	2	125	37.5
Experience (n= 100)	>1 year	32	-	33
	1 et 5 years	28	-	28
	6 à 10 years	33	-	33
	11 et 15 years	6	-	6
Labor use (n= 100)	Familial		82	
	Paid labor		17	

n= number of breeders; > = more than; < = lest than

Other herders (41-60 years old) had generally mixed herds, formed of goats and sheep (39.53%), followed by mono-specific herds comprising only goats (27.90%) and cattle. (11.62%). In this group of breeders, the income from the sale of small ruminants can be used to acquire big animals, thus increasing the number of species in their herd. For some breeders, the herds were mixed of cattle, sheep and goats (11.62%). The types of herds and species in urban community of Ati are presented in Figure 1.

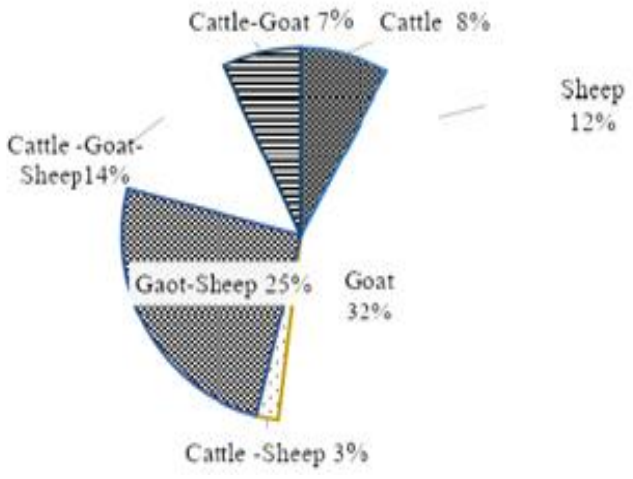

Figure1. *Types of herds and species in urban community of Ati*

From this figure it appears that herds were either made of single species or mixed species (one or two species). Herds are mainly constituted of goats (32%), sheep (12%) and cattle (8%). Mixed herds were mainly made of sheep-goats (25%), Followed by cattle-sheep-goats (14%) and sheep-cattle (3%). In an arid zone like Sahel, the choice of breeders seems to be based on a particular reason given by the breeders Figure 2.

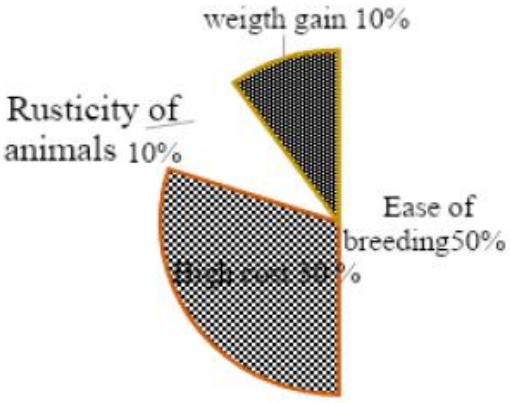

Figure2. *Reason of choice of the breed animal species by the breeder in the UCA*

The investigation of small ruminant's husbandry in UCA has shown that, the breeder's choices seem to be based on an ecological conditions and interest. Though the choice varies from one breeder to another according to his experience and the advantages of keeping the animal. In this study, 50% of breeders choose goats because they seem easy to rear in a Sahelian conditions where forages are scares and irregular. In the arid zone and especially in the dry season, goats consume even toxic plants like Calothopus procera to subsist without any risk. But very few farmers mentioned the rusticity (10%), as well as the rapid weight gain (10%) of small ruminants as an important factor of choice.

Considering the financial income of animals, some breeders considered that, the high cost (30%) as a factor of choice for reproductive breeds, if one has to start animal reproduction. Many farmers stipulated that sheep herds generate more financial means during various ceremonies (religious festivals and marriage). Animal production under particularly difficult conditions requires experience. Indeed, this study has shown that 33% of breeders are inexperienced (less than a year); while some (33%) have approximately six to ten (6-10 years) and other (28%) haves approximately five (5) years of experience. Very few (6%) breeders have reached 11-15 years of experience in animal breeding in the community of Ati. Breeding experience and the level of education (Table 3) influence animal breeding technics. Whatever the age, it has been observed in the UCA that, the purchase (82.05%) of the animals remain the principal mode of acquisition of breeding stock.

For young breeders (under 20 years of age), donation (16.66%) represents the second means of acquiring reproductive breeds. On the other hand, for breeders over 61 years, inheritance (25%) constitutes the second mode of acquisition of breeds after purchase (75%).

The investigation of farmers aged between 20 and 40 years showed that the payment of loans (2.32%) can be considered as the third means of acquisition of breed of small ruminant in Ati. For breeders aged between 41 and 60 years, some have started animal production through inheritance (7%). Housing technics vary from one farmer to another. Regardless of age, three main types of housing have been observed in Ati division.

Indeed, the house (50%) and the use of fences (33.33%) constituted the main structure for animal accommodation in UCA. Moreover, some farmers (20-40 years) (15.11%) use the ropes to tie animals on sticks during the night. For those aged between 41 and 60 years, houses (32.55%) and the fences (9.3%) are used to contain animals; though, some breeders also allowed their herds in liberty (13, 95%). This study showed that, the majority of small ruminant's breeders utilize family labor (82%) to protect the animals as a guard. Nevertheless, some breeders have a monthly paid service (16%), to minimize the risk of production. Herds are usually conducted in groups (75.58%)

or individually (28.58%) on pasture. However, some breeders (37.50%) leave their herds in divagation. However, intensive breeding practices (12.50%), animals were kept in confinement throughout their lives in the family under the shed. The investigation has shown that, the most appreciated animal products were milk (84%), meat (9%) and animal trade (7%).

Table3. *Animal acquisition and breeding husbandry practices*

Age ranges	Breeding practices		Percentage
< 20 years (n=6)	Mode of acquisition	Purchase	83.33
		donation	16.66
	Housing	Bokaro	50
		fence	33.33
	Guardian	in group	100
		individuals	-
		In liberty	-
20- 40 years (n= 43)	Mode of acquisition	Purchase	88.37
		donation	4.65
		heritage	6.97
		Loans	2.32
	Housing	Bokaro	53.48
		fence	9.3
		rodes/piquets	20.92
		in liberty	13.95
	Guardian	In group	74
		individual	24
		divagation	2
41 - 60 years (n= 43)	Mode of acquisition	Purchase	86.04
		donation	6.95
		heritage	7
	Housing	Bokaro	32.55
		fence	9.3
		In liberty	13.95
	Guarding	In group	76.74
		individual	23.25
> 61 years (n= 8)	Mode of acquisition	Purchase	75
		héritage	25
	Housing	Bokaro	37.5
		fence	12.5
		in liberty	37.5
	Gardiennage	in group	50
		individual	37.5
		Confinement	12.5

n= number of breeders; > = more than; < = lest than

Most of the farmers (88%) declared that income generated from animal products were used to buy food, while others suggested that money generated from livestock sale were invested to pay scholarship for children's and building house for the family. The major constraints of livestock in the UCA include acute deficiency of forage (92%), lack of potable permanent source of water (6%) and occurrence of pest diseases (2%) which kill numbers of animals, mostly in a dry season (97%).During this period, forages are scarce and supplementation or complementation becomes mandatory. The study showed that, the lost due to accident and theft of animals Have Been Very Little Reported by the Breeders.

Main Forage Species

In the Sahel, ruminant husbandry depends mainly on natural forages pastures. Satisfying the nutritional requirement of animals become difficult in the dry season: the supplementation or complementation become necessary during this period. In the surrounding villages of the municipality of Ati, grasses are the main foodstuffs for ruminants. Dactyloctenium aegyptium (75%), Cenchrus biflorus (62%), Echinocloa colona (29%), Brachiaria deflexa (26%) and Eragrostis tremula (25%) were reported as the major forages grasses species used in ruminants feeding (Figure 3).

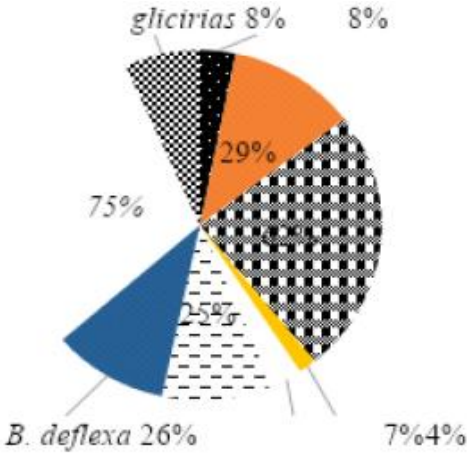

Figure3. *The main forage grasses identified among the pastoralists of urban community of Ati*

While species like Schoenefeldia gracilis (17%), Oryza breviligulata (8%), Digigtaria marginata (7%) and chloris barbata (4%) which were fairly reported, seem to be the species less abundant in pasture. Some species such as Echinocloa colona, Schoenefeldia gracilis and Oryza breviligulata are species often found in lowlands. The others are found in fallow on sandy or clay soils. Pastured very early, these species only provide feed for animals during the dry season; some species are also mowed and stored for complementation of animal nutrition during the dry season. Dactyloctenium aegyptium (75%), Echinocloa colona (29%), Brachiaria deflexa (26%), which is sometimes marketed by women. Crop residues, leftovers and agro-industrial by-products are also used and marketed in the urban communities of Ati (Figure 4).

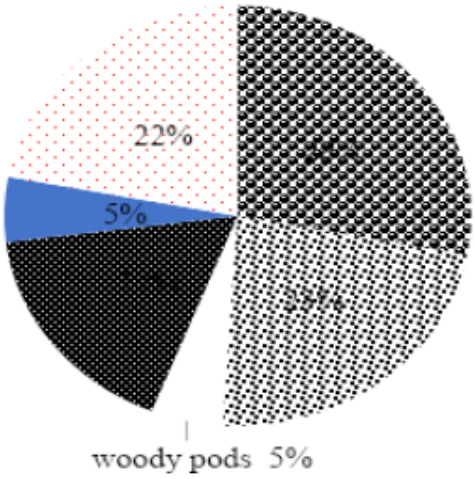

Figure4. *Sources of feed supplements used by breeders in UCA s*

Supplementation is often done with cowpea hay (23%), followed by cakes (22%) and brans (17%), and natural fodder (5%) purchased on the market. Mineral supplementation (28%) is important for breeders in this study.

DISCUSSION

The findings of this study reveal different breeding practices among ruminant's breeders in the urban community of Ati. These differences may be related to the age, sex, work experience, and ethnic groups to which the breeder belongs (Kiema et al., 2012). Breeders were mainly Arabs (26%) followed by Fulbe or peulhs (25%). The settlement of the Arabs around the town of Ati, which was considered before as a rural area, could be explained by the need of sedentarization of farmers, in order to practice agriculture, and market animal and their products such as the milk or to exchanges goods with the population (Vias et al., 2003, Lawal et al., 2017).

This result agrees with the observations of Djalal et al. (2011) who reported that Arabs are the main breeders in the Sahelian zone of Chad. However, it differs from that of Lawal et al. (2017) who speculated that livestock farmers in the urban area (45.6%) of Niamey are predominantly Zarma. Meanwhile, the Foulbe, are much more concentrated in the peripheral areas of the municipality of Ati, and represent the second largest ethnic group involved in small ruminant husbandry. They are usually pastoralists owning sheep herds who are settle around the town after the losses of some animals, either to farm or become salaried shepherds (Carrière, 1996; Djalal, 2011).

This result agreed with many authors. Indeed, Lawal et al. (2017) and UNICEF (2016) showed that the Peuhls lived around the urban community of Niamey to cash their milk production; while Laouali (2014) reported that most of Arabs are transhumant pastoralists, assisted by Foulbe who are mainly cattle and sheep breeders. Though, with the frequent fluctuation of rainfall, pastoralists need to be settled for their integration into the economic system, when they find that access to basic socio-economic services (health, education, financial, etc.) remains difficult (FAO, 2012). Other ethnic groups such as Bilala (16%) and Kouka (15%) come third and fourth respectively, were previously farmers. Their commitment to livestock can be explained by a progress made agriculture in which financial incomes have been generated to acquire animal's breeds. Father more, Bilala people also

fish in Lake Fitri in a neighboring division. However, this result differs from that of Djalal et al. (2014) who reported that Arabs, Zakhawa, Gouranes are sheep breeders, and that Bilala, Haoussa, Borno are traders. The majority of breeders (92%) were married and very few (6%) were single and widows/widowers (2%).

This result is in agreement with several authors (Vias et al., 2003; Mani, 2013; Abdoul Aziz, 2014, Lawal et al., 2017) who stipulated that breeders are generally heads of households and the oldest are mainly farmers, traders who generally use family labor. The investigation showed that men (68%) were much more involved in ruminants breeding in UCA than the women (32%). The average age of the breeders varied between 40 and 60 years old. These results corroborate those of Djalal et al. (2014) who found that sheep owners are generally (91.26%) male and (8.74%) female.

These authors reported that the average age of breeders were 45.86 years. The average size of the family of breeders ranged between 1-5 children for some (44%) and between 6-10 children for the others (36%). This result differs from that of Keima et al. (2012) who showed that most of the farms surveyed in Ouagadougou, in Burkina Faso, have more than ten (10) people for breeders aged 40 years old, while those under 40 years had a family size ranging between 5 to 10 people. The majority of breeders were uneducated (67%), only 21% of breeders have primary education, 10% with secondary education and very few breeders (2%) have a higher level of education.

The education level in this study seems to be higher than that reported by Kiema et al. (2012). They reported that the education level of Sahelian breeders was 5.5%, with only 8.8% of that of literacy. Though, it corroborates with the result of Mingoas et al. (2014), who reported that, apart from Peulhs and Mbororo, other ethnic groups like Massa, Moufou, Moundang, Toupouri, Kapsiki and Guiziga who are passionate in keeping from the Far North region of Cameroon are educated. But this result is in contradiction with that of Tendonkeng et al. (2013) who reported to South (Mvilla division) Cameroon that the majority of small ruminant herders have a higher level of education, with 57.9% for the secondary level; 26.3% primary level; 12. 3% with higher level of education, and only 3.51% between them have not been to school. The low level of education of breeders in the UCA, who are entirely Muslim, could be due to ignorance of importance of formal education and socio-cultural reasons (Missohou et al., 2016). Agriculture seems to the main activity of some breeders (36%), while others (34%) are purely livestock producers; 7% were traders and 22% were doing daily jobs. This result agrees with that of Djalal et al. (2014) who reported that pastoralists are agro-pastoralists and traders.

In the western division of Batha, the ruminant production target is mainly dairy production (84%), followed by meat production (9%) and trade (6%). This result is contrary to those of Wikondi (2010) and Tendonkeng et al. (2013) who have shown in the extreme north and South (Mvilla division) of Cameroon that small ruminant breeding objective was self-consumption of meat. Similarly, Djalal et al. (2014) suggested in their study that some breeders (Arab and Gourane) consume ewe's milk, and some of the breeders (38.20%) want to improve ewe's milk production. These observations corroborated with the results of Gnanda (2008) and APESS (2013) who stipulated that farmers produce milk throughout the year; and the milk supply in Sahelian zone is 40% for Burkina Faso, 44% for Niger, 43% for Chad and 35.5% for Niger.

In the urban community of Ati, herds comprise all ruminants' species (Suttie, 2004; Djalal, 2011). The majority of herds made of single species of goat (32%) and mixed herds comprising sheep and goats (25%) followed by the herd of sheep (12%) (Gnanda, 2008). The choice of goats for reproduction could either due to the strategy of breeder's conformation to ecological conditions, or to the specificity linkages with animals.

This specificity, according to many authors, could be due to traditional cultural and religious links that exist between man and animal; but also between the animal and its natural environment (Djalal, 2011, Missohou et al., 2016). Djalal (2011) reported that these links seem to be marked between the major's breeders (Arabs and Fulbes) and goats and sheep, respectively. In this study, the herd mainly made of goats, could be due to the ease of its breeding, its ability to value the poor forages of the pasture and its rusticity. The high cost of sheep was a reason for choosing this species to form an economically profitable flock. This observation agrees with Djalal et al. (2014)

reported that sheep owners have higher incomes than cattle and goat farmers in eastern Chad. The proportion of single herd of goat and mixed herds (goat-sheep) were higher in this study.

This result corroborates the researchers' assertion that small ruminants are easily cash hoarding devices (Missohou et al., 2016). Indeed, the choice of the mixed herd would be related to the experience (6-10 years) of breeders who have practical knowledge in breeding technics in arid zones. The mode of acquisition of breed in this study is usually by the purchase (82.05%) of breeding stock, regardless of the age range. Among the young breeders, donation (16.66%) constitutes the second mode of acquisition of animals. While for older breeders, inheritance (25%) is the second mode of acquisition, followed by payments of debts (2.32%).

This information is line with that of Wikondi (2010) and Tendonkeng et al. (2013) who reported that the acquisition of ruminant's breeds in the extreme north and in South (Mvilla division) of Cameroon is mainly by purchase. The donation which represents 16.66% of the modes of acquisition was mostly observed among the young breeders (<20 years of age). This could be explained by the indirect payment of guarding services offered by the children that empowered the social links between the different families.

This practice is commonly observed among Arabs and Peulhs communities. Though, guarding labor in this investigation was essentially family-based (82%) and wage-earning (16%), and animal divagation (37.5%) noticed among older breeders (40-60). years), however, the confinement (12.50%) also exists in this group of breeders. This result is superior to that of Tendonkeng et al. (2013) who found in South (Mvilla division) Cameroon that 76.28% of services was on family-base, but inferior to that of Wikondi (2010) who reported 99% of the cases divagation of small ruminants in extreme North Cameroon.

In the UCA, the huts serve mainly (43.28%) as a means of contention of the animals followed by the use fences (33.33%) and the rope attached to the sticks (19.76%) fixed in the ground during the night. But some breeders leave their animals in liberty (25.72%). This result is differing from that of Tendonkeng et al. (2013) who reported in South (Mvilla division) Cameroon that small ruminants are not confined, but it is in agreement with the behavior of farmers in the extreme north of Cameroon who keep small ruminants in huts, and others under the shade. Regardless of age range, herds were led to the pasture in group. This could be explained by the good relations between the children (herd shaper) or breeders.

The individual care of the herd could be due to the large number of herds which, their association would cause incidences (fights, poor nutrition) and damages. The main constraints for animal husbandry in the UCA are such as feed deficiency (50%), diseases (35%) and lack water (6%) which is recurrent in the dry season (97%). The case of theft and accident were less observed among breeders in the municipality of Ati. This result differs from those of Tendonkeng et al. (2013) who found in South (Mvilla division) of Cameroon that theft is the main constraint to rearing small ruminants followed by agro-pastoral conflicts.

The main forage grasses identified in peri-urban rangelands in the municipality of Ati are similar to what reported Kiema et al. (2012) and Lawal et al. (2017). Without being exhaustive, the main forage grasses listed by the breeders are agree with the result of Béchir et al. (2009) who reported the existence of some forage grasses around pastoral wells in Fitri (Chad). Likewise, this result is similar to those of Kiema et al. (2012) and Sanou et al. (2016) who revealed in their findings in Burkina Faso the presence of these grasses.

Forages scarcity, the lack of water diseases occurrences constitutes the main constraints of animal husbandry in the dry season. During this period, several by-products such as Cowpea hay (23%), cakes (22%), and cereals brans (17%) are used to complements animal feeding. These agriculture by-products, agro-industrial by-products and kitchen waste are usually sold in during a dry season.

Also, natural forages grasses (5%), woody pods (5%) and mineral were fed to ruminants in UCA. This practice is in agreement with the result of Kiema et al. (2017) who reported that farmers mainly use kitchen waste (24.6%), followed by crop residues (5.26%) to maintain animals during the dry season. Moreover, it corroborates with the finding of Manjeli et al. (1995) who reported in western Cameroon that farmers (74.4% respectively) complement animal feed with kitchen waste. This justifies the assertion of Béchir et al. (2009) who reported

that in the dry season, ligneous (pods) are more used in animals diet supplement; and mineral supplementation in the form of stones is important to avoid crucial health problem of herds and can be sold in veterinary pharmacies in Africa. Faced with the remarkable unavailability of fodder, animals are abandoned to their plight in search of food and water.

CONCLUSION

At the end of this study, we can conclude that small ruminants breeding in UCA is carried out by married men, with Arabs, and the Fulbe as the major breeders. Being the heads of households, almost all farmers have not received a formal education. The self-consumption of milk, the sale of products and or animals is the main objectives of animal production.

Having low education level, and little experienced, these breeders use mainly family labor. In the flocks, single-species herds consisting of goats are in the majority followed by mixed herds consisting of goats-sheep. The average size of goat herd is higher than sheep. The main reasons for choosing the species seem to be based on ease of rearing and the high cost. Breeders generally buy the breeds for reproduction, and the herd taken to pasture in group. The huts were widely used for housing animals in Ati division. Animal confinement was rarely observed and the contention of goat and sheep during the night with the rope was observed.

The lack of forages, small ruminant pest and the lack of means of transport were among others, the main constraints of the small ruminant's husbandry. The main forage grasses of rangelands are usually complemented with crop residues, kitchen wastes and agro-industrial by-products.

Natural forages and pods of ligneous and are regularly used to supplement the diet of animals in the dry season. To overcome the constraints noted, farmers wished to be trained on animal health, feeding and reproduction technics to minimize losses.

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