

# Socio-Technical Characteristics of Goat Farming in the Commune of Bambey Senegal

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## Summary

Goat rearing was the subject of a study in the commune of Bambey, Senegal. The study was conducted among 162 farmers. The surveys focused on the socio-economic characteristics of the farmers, technical management and the evaluation of the economic performance of the farms. The average age of the farmers was  $48.93 \pm 16.65$  years and ranged from 17 to 86 years. They had elementary (12.3%), middle (7.4%), secondary (4.9%) and higher (6.2%) education. However, 9.9% had attended an Arabic-Koranic school. The main reasons for raising livestock were for sale (57%) and for self-consumption (33%). The breeds raised were the Sahel goat (52%), the Maradi red goat (21%), the dwarf goat commonly known as the Casamance goat or Djallonke goat (17%) and the mixed breeds (10%). In the dry season, 67% of the goats are kept in the open and 66% in the rainy season. The average age at first calving was  $12 \pm 4.63$  months. The average interval between births was  $10 \pm 1.82$  months and ranged from 7 to 12 months. Diarrhoea (65%) and abortions (11%) are the most common pathologies encountered. The most common constraints are related to theft, pathologies and feeding. The improvement of livestock farming requires capacity building for farmers and the implementation of a research and development programme.

**Key words: goat, characterisation, roaming, feeding, income, constraint.**

## I: Introduction

Senegal is an agricultural country due to its geographical position, climate, land and water system. It is predominantly rural, with 54.8% of the population living in rural areas as opposed to 45.2% in urban areas, and is growing by 2.6% per year (ANDS, 2017). In Senegal, there are 755,559 agricultural households, i.e. 49.5% of households in Senegal.

Agriculture plays a preponderant role in the macro-economic and social balance. The contribution of agriculture to national GDP, which was 18.75% over the period 1960-1966, is currently 6.6%. It accounted for 50% of GDP in the primary sector in 2014 (PSE 2013).

Livestock activities provide a livelihood for 30% of rural households. However, in addition to being a source of food and cash income for these populations, livestock also plays a role in saving, insuring against risks, providing a safety net and supporting agropastoral systems.

Over the period 2010-2014, the sector contributed an average of 28.5% to the value added of the primary sector and 4.3% to GDP. The value of live stock is estimated at 847.48 billion CFA francs, of which nearly 585 billion CFA francs are for ruminant livestock alone.

Senegal livestock population was 18,313,988 head in 2018. It is composed of 3627858 cattle (19.81%), 7132356 sheep (38.74%), 6050862 goats (33.04%), 451383 pigs (2.46%), 568261 equines (3.1%), 478279 asians (2.61%) and 4989 camels (0.03%).

The goat (*caprahircus*) is a small animal and therefore easy to feed. In other words, it is a very prolific animal at a low price and its breeding is less risky. Senegal's meat and slaughter production was 242,641 and 258,112t respectively in 2016. The share of goats in this production is 8.89% for meat and 10.89% for offal.

Urban and peri-urban livestock farming takes very diverse forms, including "classic" professional forms, but also livestock farms intended to supply short circuits, for self-consumption, and amateur livestock farms for leisure or educational purposes (Delfosse et al., 2017). However, Senegal is still unable to meet the meat and milk needs of its population. In view of the galloping population growth observed in recent years, it is clear that the food deficit, with a growing demand for animal proteins, will increase (Diouf, 2012).

It is within this framework that this study is being conducted. The objective of this study is to contribute to the production of knowledge on goat breeding in the commune of Bambey in Senegal.

The aim is to characterise the breeders from a socio-economic point of view, to diagnose the technical and economic aspects of goat breeding and to analyse the various constraints.

## 2: Materials and methods

### 2-1. Study area

Located at 14042 North latitude and 16027 West longitude, the commune of Bambey in Senegal is the chief town of the eponymous department. This commune in the administrative region of Diourbel has an area of 4.1km<sup>2</sup> and a projected population of 34787 inhabitants in 2019, 53.03% of whom are women. It is characterised by its youth (44.8% are under 15 years old). The population under 20 years old is 55.7% and only 3.5% are 65 years old or more.

The population is dominated by the Wolof ethnic groups (60%) and the Serer (25%). The other 15% are the Diolas, the Manjacks, the Sarakholés, the Bambaras, the Maures and the Halpulars. The languages spoken are: Wolof (72%), Serer (15.7%), Halpular (10.2%) and others (2.1%). The dominant economic activities are trade and agriculture.

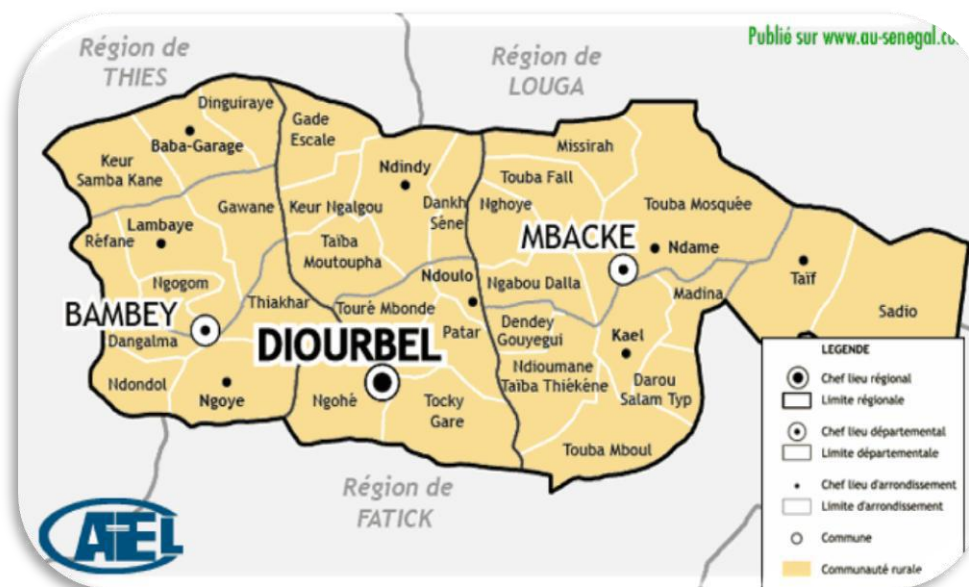


Figure 1: Administrative boundaries and position of the department of Bambeý

(Source AVSF, 2016)

## 2-2. Data collection and processing

Data collection was done through informal and formal surveys. The formal survey was systematic. All identifiable and known herders were surveyed and numbered 182. The socio-economic characteristics of the herders sought were: gender, age, ethnicity, level of education, occupation, reason for herding, length of time in business, and origin of animals. The zootechnical data documented are: breed, type of production, current size, herd structure, mortality rate, sex ratio, pathologies encountered, reproductive management, feed, workload, operation. The economic data of the farm to be identified were: the different expenses, revenues and their destinations.

The data collected were processed with Excel 2013 (tabulation matrix) before being analysed with SPSS software, IBM SPSS Statistic 20 version (descriptive analysis, pivot table, mean, standard deviation, frequency, minima, maxima,  $X^2$  test of independence on pivot tables).

## III: RESULTS AND DISCUSSION

### 3.1 RESULTS

#### 3.1.1 Socio-economic characteristics of farmers

Goat breeders are women (76.5%) and men (23.5%), and they are distributed among six districts (Table 3). They are more present in the DVF (35.8%), Wakhaldiam (22.2%) and LéonaSud (16.05) neighbourhoods.

They are married (72.80%), widowed (17.30%), single (8.6%) and divorced (0.2%). Gender influences marital status ( $X^2= 0.000$ ).

The average age of the farmers was  $48.93 \pm 16.65$  years and ranged from 17 to 86 years.

#### 3.1.1.2 Level of education, ethnicity, religion and occupation

They are all Muslims and the majority are illiterate (59.30%). The illiteracy rate among women is 87.5% (Figure 6).

The other farmers had elementary (12.3%), middle (7.4%), secondary (4.9%) and higher (6.2%) education. But also 9.9% have attended Arabic-Koranic school. Those educated in Arabic or Koranic are mainly men (6/8).

The ethnic groups present are the Serer (50.62%), Wolof (29.63%), Poular (18.52%), Diola (1.23%)

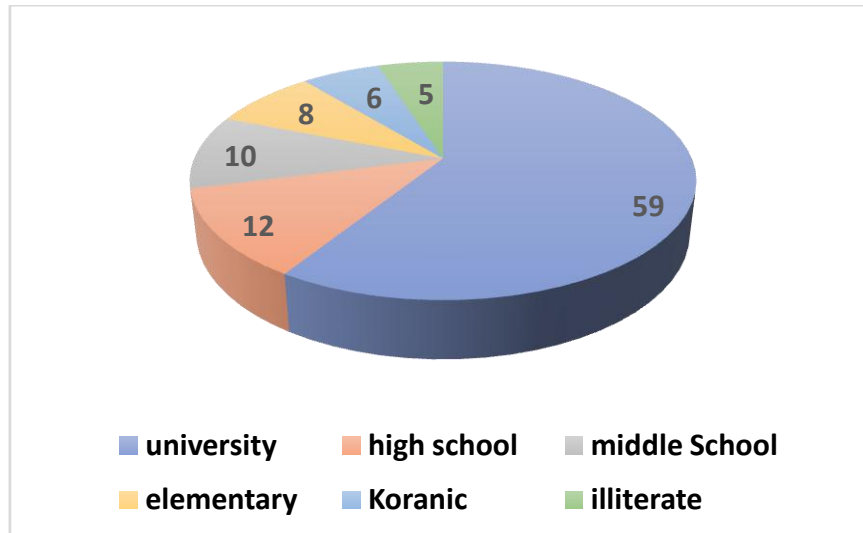


Figure 2: Distribution by educational level

#### 3.1.1.4 Reason and duration in farming

The main reasons for keeping goats were, sale (57%) and self-consumption (33%), family ceremonies (4%), love to animals (4%) and tradition (2%). The secondary motivations were more marketing (33.33%) for income generation, use of goats during religious and traditional ceremonies (30.16%).

Gender ( $X^2=0.606$ ), age ( $X^2= 0.61$ ) as well as ethnicity ( $X^2= 0.191$ ) have no influence on the reasons for breeding.

The average duration of goat farming is  $16.65 \pm 15.15$  years. However, it varies from 4 months to 70 years. The reasons for breeding do not influence the duration of the activity ( $X^2= 17.6$ ).

#### 3.1.2 Technical characteristics

##### 3.1.2.1 Breeds and numbers

The main goat breeds are the Sahel goat (52%), the Maradi red goat (21%), the dwarf goat commonly known as the Casamance goat or Djallonké goat (17%) and the mixed breeds (10%). The mixed breeds are more crosses between the Sahel and Maradi goats.

The total number of goats in the sample was 1,436, comprising 898 goats (62.5%), 320 kids (22.3%) and 218 hogs (15.2%). The average number of goats per farmer was  $8.86 \pm 8.29$  and ranged from 1 to 43 goats. However, some farmers only have adult females (12%). The average number of goats at start-up was  $1.86 \pm 1.67$  and ranged from 1 to 10 animals.

Goat farmers (47%) had other domestic species such as sheep (58%), poultry (26%), equines (10%) and cattle (6%).

##### 3.1.2.2 Origins of animals, housing and equipment

The goats were obtained by purchase (72%), donation/inheritance (24%) and self-production (4%) for the start of the activity. The evolution of the herd is ensured by self-production for the majority of owners (79%). Some

of them (10%) buy 1 to 3 females per year to increase their herd or to restart the activity in the event of major losses due to mortality or theft.

They have housing (71.25%) for their goats and the (28.75%) leave their goats in the open. The types of housing encountered are shelters with roofs made of traditional materials (50%), pens without roofs (22%) and housing with roofs made of modern materials (28%).

The small-scale equipment used by the farmers consists of feeders, drinkers and equipment for tying up the animals. Basins (71%), buckets (12%), bowls (4%) and other (13%) are used as feeders. However, 22.22% of goat owners use feeders as waterers and vice versa.

### **3.1.2.3 Eating habits**

Depending on the season, there are different feeding habits. In the dry season, the goats roam (67%), semi-divide (28%) and are stalled (5%). When they return from roaming, they receive peanut meal (69%), industrial concentrate called 'ripasse' only (20%) or local cereal by-products (11%) as feed supplements. Goat owners who keep their goats in permanent stalls distribute the hay as much as they want and the industrial concentrates in the evening.

The feed rations consist of haulm, concentrates and kitchen scraps and household waste. The rations are distributed as follows: hay and concentrates (69%), hay only (11%) or concentrates only (20%). In addition to the fodder collected during the grazing period, the rations include (for more than 80% of the farmers) kitchen scraps and household waste in addition to the above rations.

During the rainy season, permanent stalling is practised by 66% of farmers. The other remaining farmers keep their goats either on stakes or on pasture and do not give them any other feed apart from the remaining food. However, those who keep their goats in stalls feed 42% with industrial fodder and concentrates, 37% with hay and industrial concentrates and 21% with hay only, in addition to kitchen scraps.

No mineral supplements are given to the goats.

### **3.1.2.4 Breeding and selection practices**

Half of the respondents do not control the age of first kidding of goats. The average age at first kidding is  $12 \pm 4.63$  months for those who control reproduction. The average calving interval is  $10 \pm 1.82$  months and ranges from 7 to 12 months. An abortion rate of 26% is recorded. There is no selection of breeding stock by the breeders. Mating is not monitored.

Litter size depends on the breed. Triple births are only observed (4/4) in the Maradi red goat, whereas the Sahel goat generally has single births.

### **3.1.2.5 Hygiene and health**

They regularly (93%) cleaned their goat house, feeders and waterers 2 to 3 times a week or more (63%), once a week (28%) and rarely (9%). In terms of health, only 61.75% of the farmers vaccinated their goats against peste des petits ruminants and dewormed (60%). Goats were treated by an animal health worker (83%) and by self-medication (17%).

Farmers used ivermectin (88%) and albendazole boluses (12%) to deworm their animals. The most common diseases were diarrhoea (65%) and abortions (11%). However, 11% of the farmers stated that they had not encountered any diseases on their farms.

Diarrhoea is most commonly found in farmers who feed leftover food to goats.

Mortality averages  $2.14 \pm 2.12$  goats and some lose up to 10. The main reported causes of mortality are diseases (72%), abortions (15%) and accidents (13%) (dog bites, fights between animals).

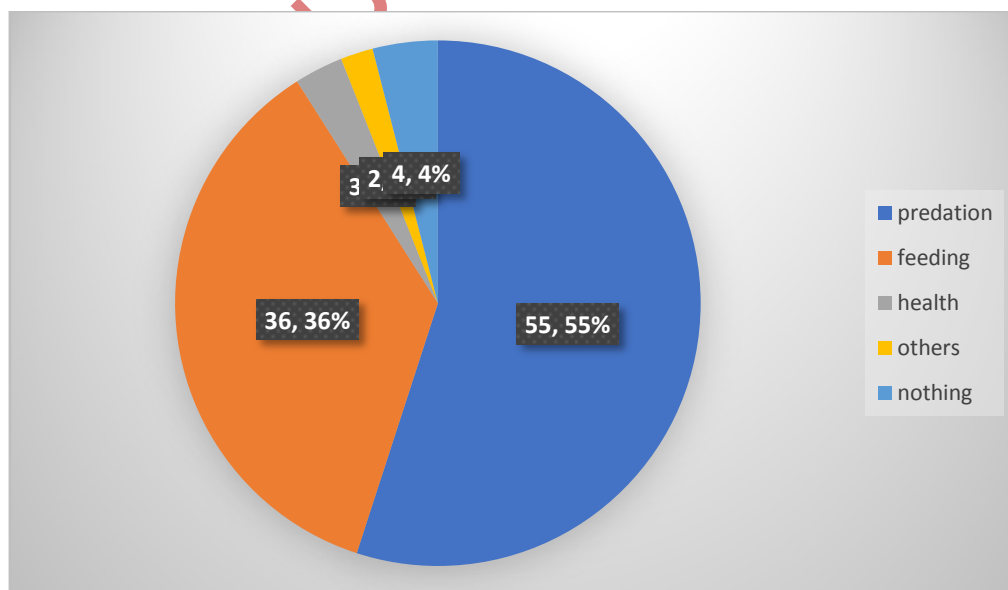
**Table 1: Main pathologies encountered**

pathologie	nombre	%
diarrhoera	104	36,88
pneumopathy	47	16,67
spoiler	36	12,77
bézoard	27	9,57
pica	23	8,16
abortion	20	7,09
alopécia	19	6,74
colic	6	2,13
total	282	100

### 3.1.4 Constraints

Goat rearing in the commune of Bambey faces a number of difficulties related to security (theft), food, health and others (lack of housing). Theft of livestock was the main constraint (55%), food (35%), health (3%) and others (2%). However, 4% of farmers said they had not encountered any constraints.

On average 4.82 goats, or half the average number, are stolen from each farmer per year. The number of stolen goats ranges from 01 to 35. In fact, some farmers have had to restart their activities because all their animals had been stolen. As for food, the high cost of food and its unavailability, such as groundnut stalks in the rainy season, were the real difficulties.



**Figure 3: Stress distribution**

## 3.2 DISCUSSION

### 3.2.1 Socio-economic characteristics of farmers

The majority of goat farmers are women (76.5%) and the average age is  $48.93 \pm 16.65$  years. This is a very feminine activity because the goat is considered a less valuable animal financially and socially than other ruminants. Goat rearing can be considered as a socially marginal activity. It is a livestock farming that interests men very little. Its role as a social mediator is less than that of sheep and cattle. Goats are rarely sacrificed during tabaski, although the religious possibility exists. The appropriation of goats by women and the average age of goat keepers are consistent with the results of Ndiaye (2019) in the framework of the ARECAP project in the regions of Diourbel and Fatick, according to which the average age of goat keepers was 50 years and 76% of respondents were women. Our results are also in line with those of Diouf (2012) in the Fatick region, according to whom 64.4% of respondents were women.

In the peri-urban area of Dakar (Ba Diao *et al.*, 1994), goats are owned by women, who own 80% of them, unlike cattle, and in the region of Thiès, women are present in goat farming at 42.3% (Fall *et al.*, 2017).

Nevertheless, the Wolof ethnic group remains in the majority with 65%, followed by the Peulh 21.9%, while here in Bambey the Serer (50.60%) are more present in goat farming. Our results are in line with those of (Ndiaye, 2019) in the regions of Fatick and Diourbel, according to which the Serer represent 47.8%.

Married people are more present in this activity with 72.80% and livestock breeding is considered a secondary activity at 88.90%. Trade is the most present activity (39.5%) followed by housewives unlike in the Thiès region (Fall *et al.*, 2017) where housewives are the most present and are followed by traders. This can be explained by the fact that trade is one of the dominant activities in the department. The professional diversification of herders at the urban level is confirmed by many other authors (Djalala *et al.* 2011, Ousseyni 2011, Diao 2008).

The illiteracy rate (59%) is much higher than that of Ndiaye 2019 (29.9%) and Fall *et al.* 2017 (36.6%). The illiteracy rate among livestock keepers varies from one area to another. The illiteracy rate is justified by the large number of women working in this sector. The latter are more involved in household chores at the family level. The illiteracy rate among livestock farmers is higher (62.9%) in Cameroon (Manjeli 1994). In Niamey and Filingué in Niger it is over 50% (Boukary *et al.*, 2007) and around Niamey 81.1% (Belli *et al.*, 2007).

The average duration of goat farming is  $16.65 \pm 15.15$  years. However, it varies from 4 months to 70 years. This shows the real experience of the farmers.

### 3.2.2 Technical characteristics

The average size of a goat farm is  $8.86 \pm 8.29$  goats. Those with between 1 and 4 goats represent almost a third of the farmers (31%). The size of the farms is strongly influenced by the ability to set up sheep pens in the homes, as space is quite limited. However, the fairly regular exploitation (consumption, sale, sacrifice) of goats means that the herd cannot reach a certain size. These results are in line with those found in the commune of Thiès (Fall, 2020), where the average herd size is  $9.75 \pm 5.98$  head. These numbers are still lower than those obtained by (Diouf, 2012) in the Fatick region, which are 15.73 animals. In the commune of Niakhar in Senegal (Diao, 2007), 95.3% of agropastoralists have goats and the average number of animals is 21.9. However, Niakhar is a rural commune and has enough space to graze the animals.

The breeds present (Missohou *et al.*, 2016) in the commune are the Sahel goat, the Maradi red goat, the Casamance goat or Djallonke goat and the mixed breeds (10%). The Maradi red goats were introduced in the

1970s by the state in order to improve hides and skins and to reduce the Sahel goats, which were reputed to be more devastating in the context of nature conservation. The presence of mixed breeds is due to the lack of control of breeding and the mixing of different breeds in the same breeding, of males and females in the same compartment, but also to the fact that they roam freely. Mating is free regardless of the feeding system used. This practice of free mating is justified because some farmers do not have a billy goat in their herds and this is particularly marked in the divagant system. Females represent 63% of the herd, kids 22% and bucks 15%. The females are kept for breeding in order to increase the size of the herd, while the males are generally sold, consumed by themselves or slaughtered during family and religious ceremonies.

The average age of first birth is  $12\pm 4.63$  months in those who control reproduction. The average interval between two births is  $10\pm 1.82$  months and ranges from 7 to 12 months. The Rousse de Maradi goat gives only double or triple births according to the breeders who prefer it to other breeds. The prolificacy characteristic of the Maradi Red goat is breed related. The prolificacy rate of the Maradi Rousse goat is 147% (Marichatouet *et al.*, 2002) and was the city of Maradi. The same trends in farrowing rates are noted elsewhere. In the peri-urban area of Dakar (Ba Diaoet *et al.*, 1994), 29.5% of births are single and 35.6% are multiple. In the highlands of Cameroon (Manjeli *et al.*, 2011), 12% of goats gave single births, while 88% of births were multiple, of which 61% were double births, 25.97% were triple births and 1.3% were quadruple births.

The number of goats in stalling, roaming and grazing is  $13.71\pm 7$ ,  $8.6\pm 3.33$  and  $7\pm 1.84$  respectively. However, in the western province of Cameroon, seasonal confinement is the most common practice and a house room is reserved for the animals (Tchouamoet *et al.*, 2005). In the central plateau of Burkina Faso (Tamboura&Berté, 1996), 50.7% of the herds are made up of goats only, against 36.6% made up of sheep and goats. 33.8% have more than 10 goats each, 29.5% have between five and 10, and 36.6% have less than five. Between 25 and 28% of the animals per flock are males, i.e. a ratio of 1 male to 3 females. Animals between 6 and 18 months of age are the most numerous, followed by those between 18 and 36 months. There are traditional theories that goats should not be tethered.

However, 11% of the farmers said that they had not experienced any problems on their farms.

### 3.2.4 Constraints

Theft of livestock (55%) and feeding (35%) are the main constraints encountered in goat farming. Rampant roaming and the lack of goat pens remain the main factors that encourage animal theft. The lack of grazing land favours the increase in the price of groundnut and cowpea vines in the dry season. In the rainy season, however, the constraints are mainly health-related, with diarrhoea being more frequent during this period. These cases of diarrhoea may be due to the transition from green fodder to groundnut.

Food expenses and diseases are the main constraints of sheep farms and are major handicaps to livestock development (Fall *et al.*, 2017). The roaming of goats is a major problem for some feed sellers because of the damage they cause (sampling). Feeding in any system remains problematic as money is needed to buy it.

However, in tropical Africa (Alexandreet *al.* 2012), the main constraints to goat production are climate, variability of feed resources, nutritional restriction and imbalance, and pathologies (gastrointestinal strongyles, trypanosomes, coccidiosis). The main obstacles to goat production in the Western Province of Cameroon are food, housing, health and lack of capital (Manjeli, 1996). In Maradi, Niger, household food insecurity, theft, lack of interest and the restrictive nature of the activity were the reasons given by those who did not practice it (Ali *et al.* 2003).

## CONCLUSION

Goat rearing in the commune of Bambey is more a female than a male activity, and the people involved in it are multi-tasking. They are traders, housewives, workers, farmers, civil servants, etc., who keep goats as a secondary activity. They are all Muslims and the majority are married and of Serer ethnicity.

Housing (sheepfolds) is more common than unroofed pens. Feeding methods include roaming in the dry season and stabling or grazing in the rainy season. The breeds kept are the Sahel goat, the Maradi red goat, the dwarf goat and the mixed breeds. Goats in stalls are fed green fodder and kitchen scraps. Goats that are roaming are fed with green fodder and industrial concentrates in addition to kitchen scraps.

The most frequent ailments are diarrhoea, abortions, digestive and respiratory diseases. They vaccinate their goats against peste des petits ruminants. Deworming is done by injecting ivermectin-based products.

However, insecurity (theft) and food are the main obstacles to the development of the goat sector in the commune of Bambey.

This is a reality because more than the majority of farmers are women and goat rearing is a source of additional income because they are often housewives.

The nature of the commune of Bambey (semi-rural) means that the owners generally keep their goats in stalls during the rainy season. The stabling avoids the goats wandering in the fields.

Goat rearing is a socio-economic activity that helps to cope with financial, social and cultural emergencies. It is not a main activity.

The diagnosis of goat breeding allows us to make proposals along two main lines:

- Capacity building for livestock keepers through training on the following topics
- implementation of a research and development programme.

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