



Cattle Breeding Practices in the Savannah Region of Togo

Douti Lardja ^{a*} and KULO E. Abalo ^b

^a ITRA B.P 1347, Lomé, Togo.

^b ESA- UL 01 BP 1515, Togo.

Authors' contributions

This work was carried out in collaboration between both authors. Author DL designed the study, performed the statistical analysis, wrote the protocol, managed the analyses and wrote the first draft of the manuscript. Author KEA validated the research protocol and survey support, followed the student's field work and regularly evaluated it, gave the necessary guidance for writing, personally monitored and corrected the article. Both authors read and approved the final manuscript.

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ABSTRACT

Due to its geographical position, the Savannah region of Togo is more affected by the effects of desertification. Climate change and human actions are degrading the natural resources on which cattle breeding depends; which pushes breeders to adapt the practices of their activities. Our study aims to analyze the different practices in the management of cattle breeding in this region of the Savannah. A representative sample of 150 breeders is constituted on the basis of their spatial distribution and the number of animals kept. A two-part questionnaire is submitted to him. The first part of the questionnaire allows us to have data on the breeder's operation while the second part provides us with information on the cattle herd. The analysis of the exploitation is carried out on the basis of the social status of the breeder and that of the herd concerns the number, breeds raised and management. The result is that the average age of farm managers is 52 ± 6 years. These breeders combine agriculture with livestock breeding and they have no fallow plots or land reserves.

*Corresponding author: E-mail: evaristedouti@yahoo.fr;

What emerges is the coexistence of three breeding practices largely dominated by the fulani ethnic group: "Cultivating Breeders", "Breeding Farmers" and "Agro-breeders". Cattle farms also include other species including sheep (48% of farms), goats (17%) and the sheep-goat association (26%). The herds are formed from purchase (49%), inheritance (31%), donations (10%) and borrowing (10%). Faced with the degradation of natural resources, the former cattle breeding areas (prefectures of Tône, Tandjouare and Cinkassé) are intensifying agricultural activities; while new ones (Kpendjal, Oti and Oti-sud) are emerging in livestock areas. Cattle breeding practices are changing; and pressure on natural resources combine with the effect of climate change to lead breeders to change.

Keywords: Cattle herd; breeding practice; natural resources; Savannah region; Togo.

1. INTRODUCTION

In Togo, livestock farming has most often retained a traditional character, a strong direct dependence on natural resources and low productivity. The growth of cattle breeding is gradually reaching limits because available land is becoming scarce and in agropastoral areas the common rangelands allocated to livestock breeding are gradually being replaced by crops. For breeders, the dynamic development of the city and strong urbanization causes pressure, or even the disappearance of areas formerly occupied by them [1].

The feeding systems of ruminants, particularly cattle herds, are based on these rangelands, exposed today to the pressures of climatic and anthropogenic factors with a negative effect on the availability of fodder resources which have experienced a drastic decline in recent years [2]. Climate change has diverse effects on vegetation. The modification and displacement of ecosystem services resulting in the vulnerability of ecosystems, the loss of biodiversity and plant biomass constitute the major effect [3,4].

The Savannah region of Togo borders the Sahelian countries and therefore constitutes a gateway for transhumant cattle. To access increasingly rare plant resources, cattle breeding systems are changing and local and foreign herds are adapting through mutual competition.

This study aims to describe the current breeding systems and practices of livestock households in the Savannah region. Specifically, the study aims to describe the socio-economic characteristics of exploitations, and the zootechnical characteristics of cattle herds in Savannah region in northern Togo.

2. MATERIALS AND METHODS

2.1 Materials

2.1.1 Study area

The study area is the Savannah region located in the extreme northern part of Togo between 0° and 1° East longitude and 10° and 11° North latitude. It covers an area of 8,470 km² or 14.9% of the Togolese territory with a population of 1,054,700 inhabitants. It has seven (07) prefectures, 16 communes, and 69 cantons [5]. (see Fig. 1).

The economic life of the region is mainly dominated by subsistence agriculture practiced by 96% of households [6]. The region excels in pastoralism and mainly raises small ruminants, poultry and cattle. The breeding system is of a traditional type focused on the exploitation of natural rangelands.

2.1.2 Technical material

The material used to characterize exploitations and breeding practices consists of a two-part questionnaire (herd and exploitation) submitted to exploitations managers and an interview guide submitted to the technical services in charge of breeding (the 7 prefectural directorates in charge of livestock).

Other equipment was also used, notably: A GPS receiver to locate the position of different points in our study area, CSPro software for map design and data entry, SPSS software for statistical analyses, Microsoft Office Excel for charts, Microsoft Office Word for designing the questionnaire and the interview guide.



Fig. 1. livestock households surveyed

2.2 Methods

2.2.1 Sampling

The study site was chosen because of the relative importance of cattle breeding compared to other activities carried out in the area; and on the other hand in relation to other geographical areas of the country.

The sample size is determined from the following formula:

$$n = \frac{T^2 * P(1-P) * N}{T^2 * P(1-P) + (N-1) * Y^2} \quad [7]$$

n= sample size ; **N**= size of target population; **P**= expected proportion of a population response. In this case, $P=0.5$; **T**= sampling confidence interval. By placing ourselves in a 95% confidence interval, $T= 1.96$; **Y**= margin of sampling error. For our study, the error is estimated at 5%.

With this formula a size of 150 livestock breeder households to survey is obtained. The identification of these breeder households is made from the nominative list of 1266 breeder households established by the agents of the services in charge of livestock. The choice of breeders by prefecture is based on the proportion of breeders in this prefecture compared to the total number in the region. The choice of farms at the level of each prefecture is made by drawing lots with the condition of a minimum number of five (5) head of cattle.

2.2.2 Survey support

This survey support has two (2) parts including the identification and configuration of the herd.

The identification of the herd provides information on the name of the breeder head of household, origin, gender, age, marital status, other activities and available land.

The configuration and operation of the herd provide information on its establishment, its composition (breeds of cattle raised, average number of animals, etc.) and the know-how of the breeder (feeding, zoo-sanitary monitoring, animal dynamics in the herd).

2.2.3 Field data collection

Before the survey's submit, seven (7) information and harmonization meetings, one per prefecture, brought together prefectural, cantonal and village breeder managers to provide them with the context, objectives and expected results of the study were organised.

The surveys are carried out from April to September 2022 and concerned breeders who are heads of households in individual interviews; while in groups, they brought together the breeders sampled by canton.

2.2.4 Data management and exploitation

The data collected is entered into the CPro software using a mask conforming to the questionnaires described above. The data are processed using the statistical software SPSS 20. For quantitative variables, means and standard deviations are calculated. Analyses of

variance (ANOVA) and comparison of means are carried out on zootechnical and socio-economic data.

Cattle breeding practices are determined using multiple correspondence factor analysis (AFCM) on 150 breeders. The study of the correlations between the various variables considered made it possible to retain a set of 17 active variables giving 44 modalities. An ascending hierarchical classification (CAH) is carried out with all the data.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Socio-economic characteristics of cattle herds

In terms of marriage, polygamists represent 54% compared to 46% of monogamists. Cattle breeding is the prerogative of the Fulani (70%), followed by the Moba (16%) and the Mossi (5.5%); the Gourma, Haoussa and other ethnic groups represent 8.5% (See Fig. 2). The average age of farm managers is 52 ± 6 years. The Fulani are omnipresent and operate in the 7 prefectures of the region.

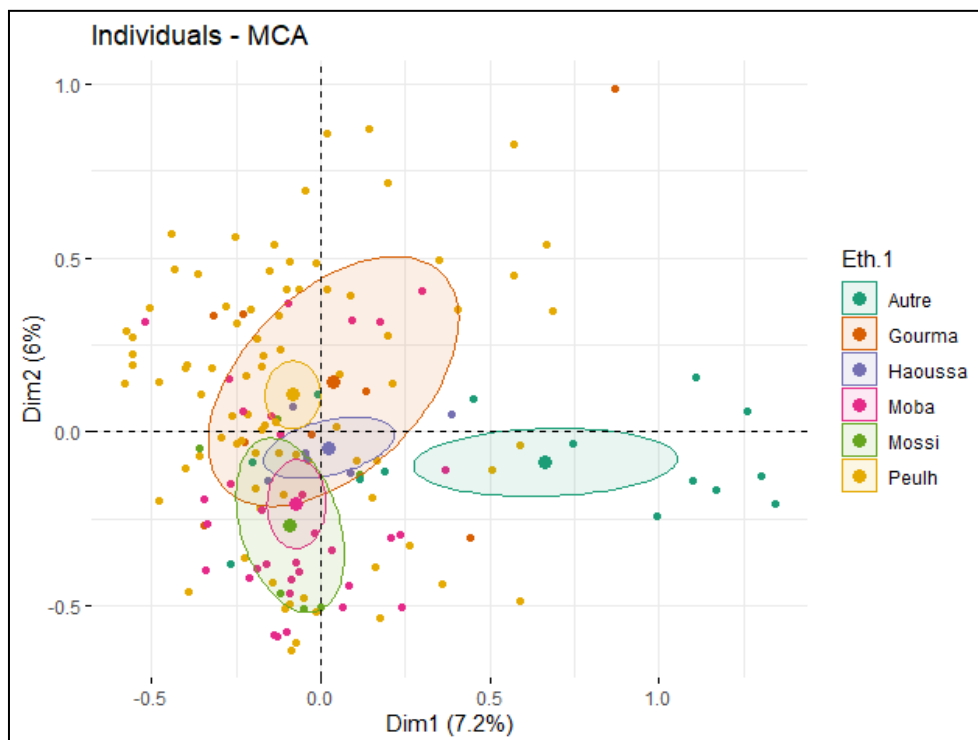


Fig. 2. Distribution of respondents according to ethnicity

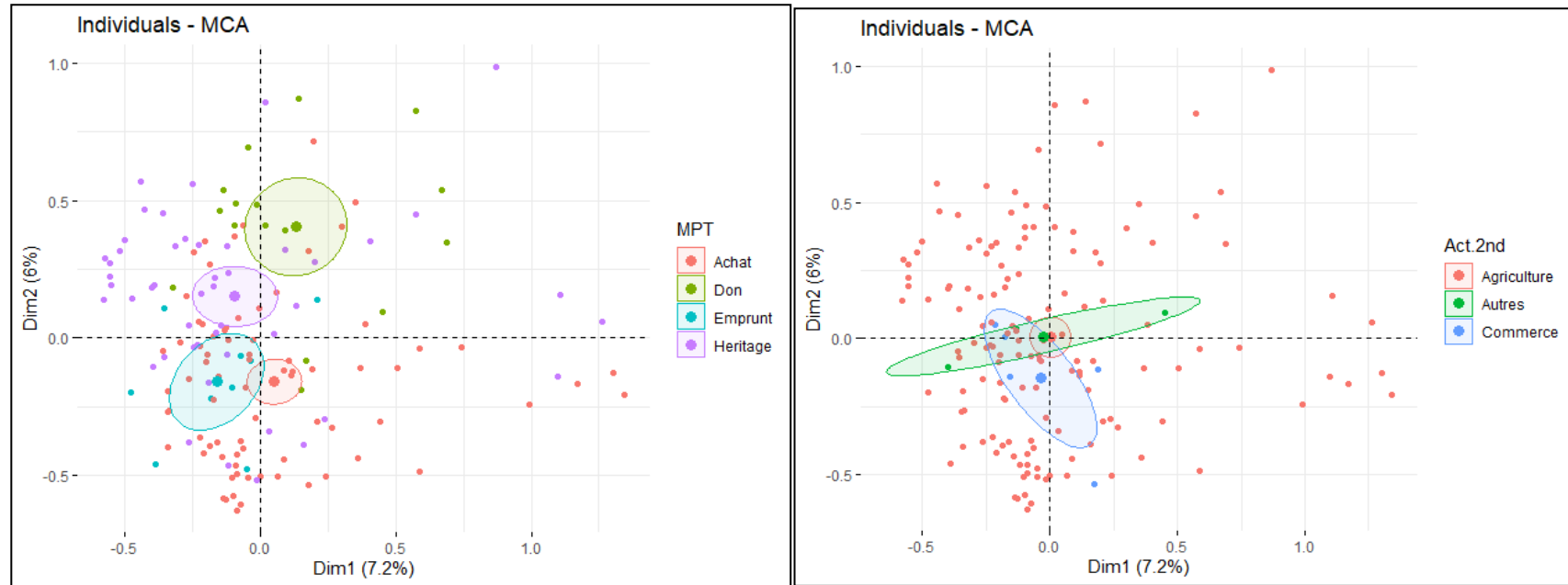


Fig. 3. a Method of acquiring the herd b Secondary activity

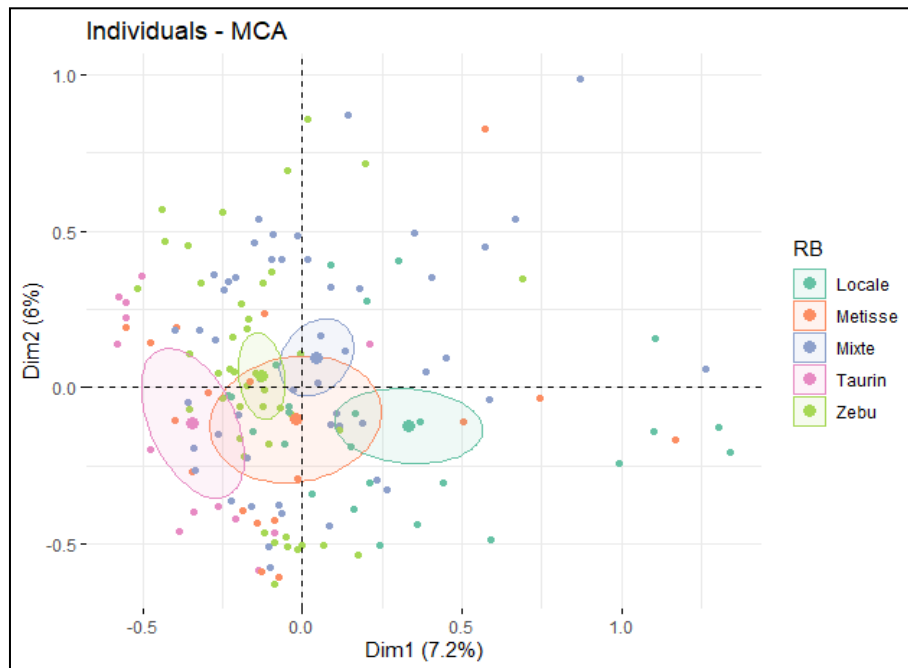


Fig. 4. Distribution of respondents according to race

The herds are mainly formed by purchase (49%), by inheritance (31%), by donation (10%) and by loan (10%). (See Fig. 3a).

Livestock breeding is associated with agriculture for 94% of respondents on an average surface area of 5.21 ± 4.54 ha of which they are not always the owners (See Fig. 3b). Due to the low availability of land, more than 90% of the livestock farms surveyed have neither fallow plots nor land reserve plots.

3.1.2 Zootechnical characteristics of cattle herds

The average number of cattle per farm is 51 ± 36 . The cattle raised are zebu and bull breeds; but we find herds there which raise the two mixed breeds. Of the 150 herds sampled, we found 13% zebu herds, 15% bull herds, 33% mixed herds and 39% mixed race herds resulting from the cohabitation of the first two (see Fig. 4).

The total number of cattle from different herds surveyed amounts to 20,960 out of the 70,369 heads recorded. These herds are made up of 18% calves; 23% heifers; 9% bull calves; 40% cows; 4% bulls; 5% draft animals and 1% cattle for fattening. These cattle are raised in a single herd (9%) or in association with sheep (48%), goats (17%) and sheep-goats (26%).

3.1.3 Breeding practices

Three groups of different practices emerge from cattle breeding in the Savannah region of Togo (see Fig. 5) but natural grazing constitutes the basis of the animals' diet.

Group 1: It brings together 50 farms in the sample. The cattle raised are mainly of mixed breed in association with sheep. The animals are driven mainly by the Fulani (58%) and the Moba (30%), especially in the prefectures of Cinkassé, Tône and Tandjouraré. Pasture and water difficulties affect 94% of the 50 breeders, especially at the end of the dry season. This situation pushes 52%, or 26 breeders, to go on transhumance to overcome grazing difficulties, while 38% (19 breeders) dig holes in the dry beds of rivers or ponds to have water to water their herds. Farmers do not have fallow areas or fodder production plots. Members practice agriculture with increasing yields; these are "Farmers-breeders" (see Table 1).

Group 2: It is made up of 88 farms, or 59% of the sample. In this group, the cattle raised are mainly of taurine and zebu breeds. Pastures being increasingly rare and droughts harsh, breeders leave early with their herds on transhumance. This type of breeding is led by the Fulani (66%), the Gourma (12%), the Moba (10%) and the Haousa (7%). It is located in the prefectures of Kpendjal and Kpendjal-west. The

harsh periods for feeding and watering animals are at the end of the dry season. Fallow fields and plots of natural grazing are becoming increasingly rare. In their associated activities, the members of these farms also practice agriculture with declining yields. These are the “Breeder-cultivators” (See Table 2).

Group 3: It has 12 farms, or 8% of the 150 sampled. The cattle raised are of the zebu (40%), bull (33%) and mixed (27%) breeds. The

associated animal species are sheep and goats at 75%. These farms are mainly run by the Fulani (75%) and the Gangan (25%) in the prefecture of Oti-sud and Oti. The difficult periods for watering and grazing are the end of the dry season, but the herds do not go on transhumance (66%). There are sufficient fallow areas and natural grazing plots. Livestock breeding is practiced at the same time as agriculture without preference, these are “Agro-breeders” (See Table 3).

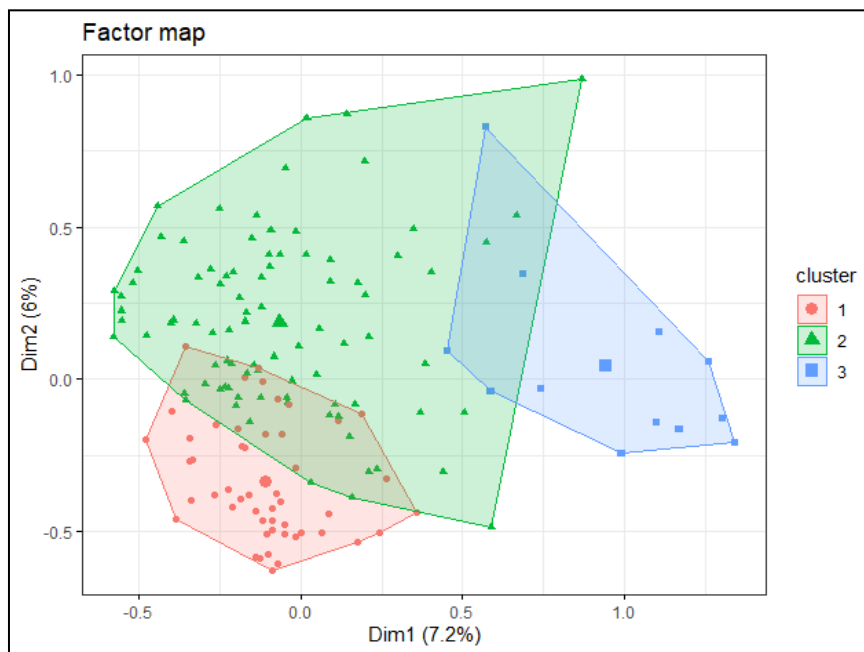


Fig. 5. Projection of respondents in the factorial plan

Table 1. Description of group 1

Variable	Terms
Designation	Group 1
Length of rainy season	Short (92%)
Length of dry season	Long (94%)
Amount of rain	Drought (86%)
Availability of pasture	Rare (94%)
Availability of surface water	Rare (94%)
Strategy you adopt for watering herds in difficult times	Dug holes (38%)
Moment of transhumance	Do not go on transhumance (48%)
Other farmed species	Sheep (60%)
Start of rainy season	-
Crop yield	Rising (56%)
Animal health	Epidemic (14%)
Difficult period for watering herds	End of dry season (80%)
Difficult period for grazing herds	End of dry season (58%)
Breeds of cattle	Mixed (60%), Zébu (32%), Bullfighting (8%)
Préfecture	Tandjoare (31%), Tône (37), Cinkasse (32%)
Ethnic group	Fulani (58%) ; Moba (30%) ; Mossis (12%)

Table 2. Description of group 2

Variable	Terms
Designation	Group 1
Lengh of rainy season	
Lengh of dry season	Normal (2%)
Amount of rain	Drought (47%)
Availability of pasture	Abundant (45%)
Availability of surface water	
Strategy you adopt for watering herds in difficult times	Transhumance (43%)
Moment of transhumance	Start of dry season (38%)
Other farmed species	-
Start of rainy season	-
Crop yield	Failing (72%)
Animal health	-
Difficult period for watering herds	End of dry season (64%)
Difficult period for grazing herds	End of dry season (34%)
Breeds of cattle	Mixed (10%), Zébu (38%), Bullfighting (52%)
Préfecture	Kpendjal (53%), Kpendjal Ouest (47%)
Ethnic group	Fulani (66%), Gourma (12%), Moba (10%), Haoussa (7%), autre (5)

Table 3. Description of group 3

Variable	Terms
Designation	Group 1
Lengh of rainy season	Normal (58%)
Lengh of dry season	Normal (83%)
Amount of rain	Normal (58%)
Availability of pasture	Normal (50%)
Availability of surface water	Normal (75%)
Strategy you adopt for watering herds in difficult times	Water reservoirs (75%)
Moment of transhumance	Do not go on transhumance (66%)
Other farmed species	Sheeps and goats (75%)
Start of rainy season	Normal (66%)
Crop yield	Normal (75%)
Animal health	-
Difficult period for watering herds	End of dry season (83%)
Difficult period for grazing herds	End of dry season (83%)
Breeds of cattle	Mixed (27%), Zébu (40%), Bullfighting (33%)
Préfecture	Oti Sud (66%) ; Oti (34%)
Ethnic group	Fulani (75%), Gangan (25%)

3.2 Discussion

Cattle breeding remains the main activity of the Fulani and secondary for other ethnic groups as evidenced by the results of other studies in the same region [8,9] that concluded: «cattle breeding in the Tône prefecture is the prerogative of the Fulani who represent 77.1%

of breeders”; “Almost all of the breeders surveyed come mainly from the Fulani’s cultural group (80%)”.

The cattle breeding herds are mainly formed by purchase and inheritance. But to strengthen socio-cultural ties, certain herds are formed by donating or entrusting animals that breeders use

for various needs. The use of animals in cultural rites, particularly in dowries, religious sacrifices and especially in "entrustments" and "gifts" between family members or friends, enormously strengthen socio-cultural ties. Livestock management is presented under three main practices in the region; which practices result from the availability and accessibility of natural resources. Among the solutions to overcome these difficulties is the movement of breeders with their herds. This result is similar to that of [9] who says that: "In West Africa, we find a great diversity of livestock systems, determined largely by climatic conditions, the landscape as well as socio-cultural factors". The results of other researchers such as [10] conclude that "mobility allows breeders to adapt both to drought of the climate, by modifying the places and duration of stay in the South, and to an increase in rainfall, by staying longer in the North.

In their travels, breeders and their animals are not concerned about the speed of progress. They make the most of the plant resources in their path. This behavior is similar to the result of [11,12] when they assert that "The exploitation of rangelands is linked to the type of resources present and the moment of exploitation" and "Within grazing corridors, the production of herbaceous fodder is variable".

The animals go on transhumance, for several months and over long distances. At the same time, herding families tend to become more sedentary without changing the mobility of the herds. By settling down, families mostly develop agricultural activities. Agropastoralism and agrolivestock therefore largely dominate throughout the region. So-called "pastoral" livestock farming is today a complex system which combines different activities and sources of complementary income. Livestock often constitutes only part of family resources. "Pure" pastoralism no longer exists. Mobility is an essential element of herd productivity. It makes it possible to take advantage of forage resources which vary in quantity and quality from one place to another during the year.

Other breeders choose association with agriculture. The agriculture-livestock association is older, with important livestock [13].

This association can gradually lead to reconversion depending on the assets in the prefecture. This is how the prefectures of

Cinkassé, Tône and Tandjouaré are more suitable for agriculture.

Conversely, the prefectures of Kpendjal and Kpendjal-west are becoming major cattle breeding areas. Similar observations on the geographical distribution of cattle breeding have been made by authors [14,15,16]: «In recent years, the Sahelian pastoral system has undergone significant changes in the representations of pastoralism and the management of natural resources», "The breeder leads his herd towards the best resources of the moment, within the limit of an acceptable effort" and "Grass is a key feed resource for both grazing and mixed crop livestock systems".

In the prefectures of Oti and Oti-sud, the indigenous breeders encountered are agrobreeders. These are farmers who acquire a few head of cattle which they keep themselves or which they entrust to herdsmen. With their vast plains suitable for rice cultivation, the prefectures of Oti and Oti-sud constitute new centers of attraction for cattle breeding which benefits from rice straw after the harvest [17] "The pastoral values of the herbaceous flora and the different discriminated groups reveal that the pastures in the area are "fairly good".

In general, "cultivating pastoralists" and "herding farmers" are the most common in almost all prefectures in the savannah region. Similar observations were made in Tchad [18,19] "From the 1980s, mixed agriculture-livestock systems were developed, called agropastoral systems" and Agriculture-livestock integration has several virtues through the facilities offered to producers to increase their agricultural yield, to environmental protection through the recycling of nutrients.

4. CONCLUSION

Cattle breeding practices and systems are changing in the Savannah region to adapt to the agro-ecological conditions of the environment. The combination of challenges in cattle breeding increases pressure on pastoral resources. Thus, breeders, faced with difficulties with food resources, develop flexible strategies for organizing and managing the herd. The survival of cattle breeding in this region of the Savannah must rely on the provision or storage of food by targeting periods of unavailability of pasture during the year.

In addition, anthropogenic activities must be environmentally friendly. Herd mobility is only possible thanks to constantly renewed and maintained social networks. These links have certainly been reduced but they remain important. Herd mobility is an effective response to the many risks that breeders face. Livestock mobility is associated with sometimes extremely violent conflicts. Largely linked to increased pressure on resources and increasing obstacles to livestock mobility. These conflicts will only be resolved when the challenges of access to pasture and water are overcome. This study then suggests the development of water points and cattle production areas as a solution.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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