

Constraints of Ruminant Rearing and Ethno-veterinary Practice Against African Animal Trypanosomosis in the Pastoral Area of Gaongho in Burkina Faso

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Abstract: In rural area of Burkina Faso, health management of domestic animals is a constant concern for low-income farmers. In this context, an ethno-veterinary survey was conducted among 62 farmers of ruminant in the pastoral area of Gaongho in Bazèga province to understand the rearing practice, to identify the main constraints of and the practices used against African trypanosomosis. For this, data were collected between March to June 2014 using a structured questionnaire and analyzed by descriptive statistics such as mean, frequency and percentages. The results showed that respondents were 48.3% literate and mainly of Fulani ethnic with an average age of 45 years. The main constraints of ruminant rearing for farmers are diseases (86.2%), particularly African Animal Trypanosomosis which is the most dominant (96.7%). To control this pathology, farmers practice modern (100%) and traditional (35.4%) medicine. Seventeen traditional herbal remedies are used to control trypanosomosis of ruminants in the area. Their modes of preparation and administration to ruminants are described according to surveyed farmers.

Keywords: Animal Trypanosomosis, Ethnoveterinary, Pastoral Area, Ruminant, Burkina Faso

1. Introduction

In sub-Saharan area of Africa, about 80% of the population lives in rural areas and depend on agriculture for survival [1]. In those countries where per capita income is often very low, livestock represents about 10 to 20% of GDP and is therefore a vital source of food, income and aid to agriculture by animal traction and organic manure [2].

In Burkina Faso, the livestock sector contributed to GDP between 18.3% and 19.5% over the period from 2001 to 2008 [3]. It is the primary source of monetary income for households for the largest proportion of poor people after

agriculture in rural farms where animals, including ruminants translates into the ease of the family. However, the rearing of these animals is confronted to health constraints which disrupt the real expression of their performances. Among these, African Animal Trypanosomosis (AAT) constitute a real constraint that preoccupies rural livestock farmers with low-income, because AAT negatively affect the productivity of their animals and consequently their incomes. It is one of the most important vector-borne diseases of tsetse flies in sub-Saharan area of Africa. With the current knowledge, the fight against this scourge is difficult because the prospects of development of a vaccine are still remote because of the great antigenic variability of the trypanosomes. Control efforts

include anti-vector control and control of the parasite's animal reservoir using trypanocidal drugs in chemotherapy and chemoprophylaxis that are currently the most common means used by many famers to control AAT [4]. However, the use of these trypanocidal drugs relies on old molecules and reduced in number. Moreover, their repeated and sometimes abnormal use (wrong dosage) and their authenticity have led to the emergence of trypanosome resistance to trypanocidal drugs (chemoresistance) reported in many endemic African countries [5]. It is therefore

important to carry out investigations in order to find a solution easily accessible to livestock farmers and sustainable over time.

This study was conducted in the pastoral area of Gaongho in the south-central region of Burkina Faso to understanding the traditional practices of animal health management in general and AAT in particular. The main objective is to contribute to the development of animal husbandry by improving animal health conditions.

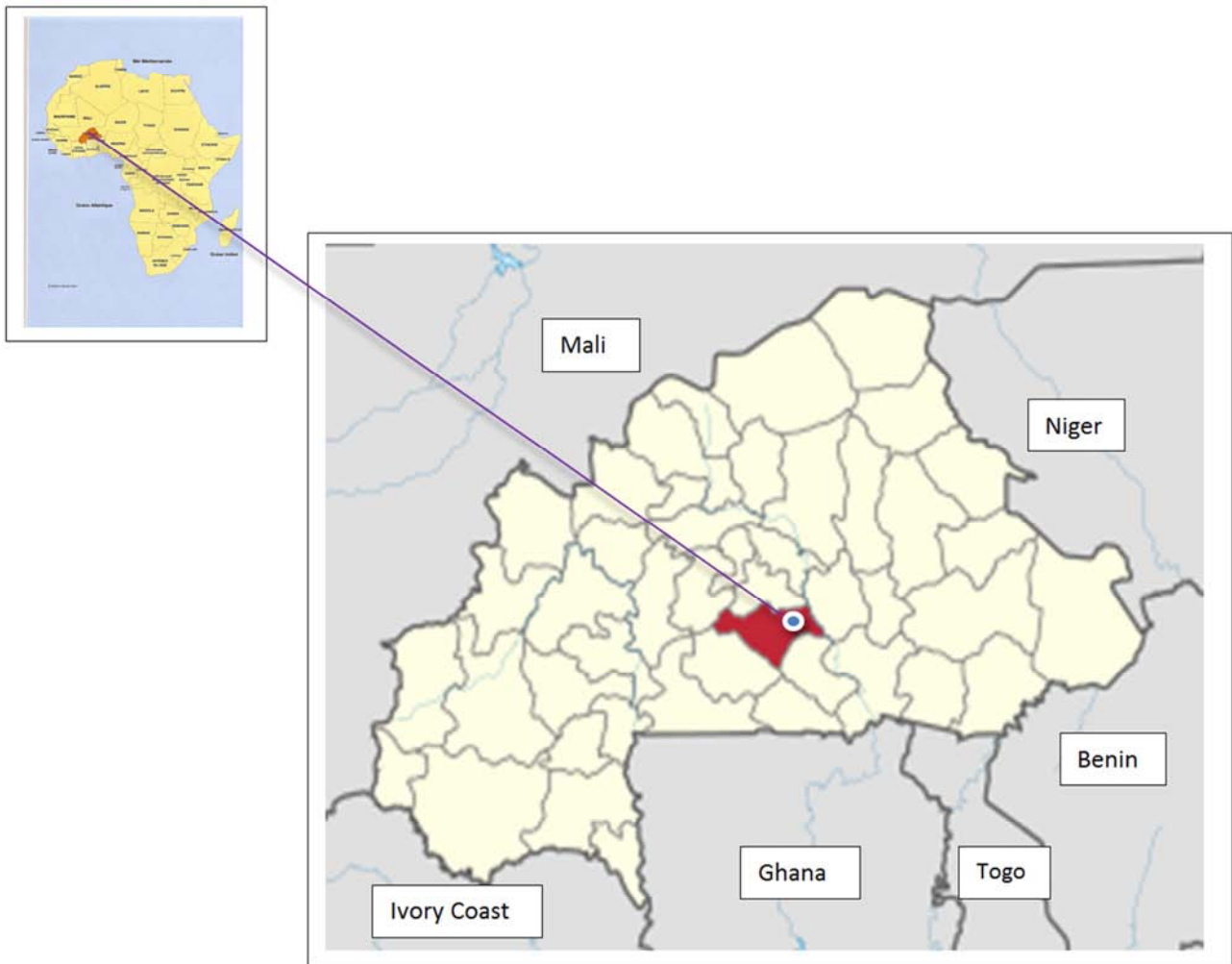


Figure 1. Localization of study area ($11^{\circ}56'$ and $12^{\circ}04'$ north latitude, $01^{\circ}03'$ meridians and $01^{\circ}09'$ west longitude) in Burkina Faso.

2. Materials and Methods

2.1. Study Area

The study was conducted in pastoral area of Gaongho that covers 6762 ha (Figure 1). This is an area which is composed of a set of rural land areas delineated and managed for pastoral activities in combination with vegetable and forest productions. The climate of the area is a type northern Sudan characterized by the alternation of a rainy season (May to October) and a dry season (November to April). Temperatures vary greatly during the year with an average of 30°C while the maximum temperature reached 38°C during

the hottest times of the year. The vegetation of wooded savannah with natural vegetation still present in the village forests and relics of forest galleries along the main lowlands. The main encountered plant species are *Parkia biglobosa*, *Tamarindus indica*, *Lannea acida*, *Lannea microcarpa*, *Sclerocarya birrea*, *Piliostigma* sp., *Guiera senegalensis*, *Mitragyna inermis*, etc. [6].

2.2. Survey Methodology

The study was conducted from March to June 2014. Sensitization was first conducted through meetings with farmers and the pastoral zone management committee in the field to discuss the objectives of the study. Then sixty-two

(62) farmers were randomly selected to be surveyed through survey forms containing a set of formal questions to facilitate accurate answers. The requested information relates to the profiles of farmers, their perceptions about production constraints and major diseases of ruminants, trypanosomes and control practices of these parasites. The questionnaire was administered individually and according to the convenience of the respondents.

2.3. Statistical Analyses

Collected data were stripped manually and then entered in Excel before performing descriptive analyzes by calculating the frequencies and percentages using Statview for Windows, version 4.57.

3. Results

Respondents were all male and Fulani ethnic group. They were mainly farmers (87%) and agro-pastoralists (12.9%) with a mean age of 45 ± 13 years. 48.3% of them were literate in French (3.2%), Fulfuldé (35.4%), Mossi (6.4%) and arabic (33.8%). All the people surveyed use extensive farming system or shelter animals bred are made with tree branches. The numbers of ruminants per farmer vary from 12 to 200 cattle (100% of respondents), from 0 to 200 for sheep (93.5%) and from 0 to 90 goats (93.5%).

Figure 2 presents the main constraints identified by farmers in the rearing of ruminants in the study area of Gaongho. Diseases are the main constraints (86.2%) followed of watering difficulties in the cattle herd (75.8%) and thefts in small ruminant herd (61.2%).

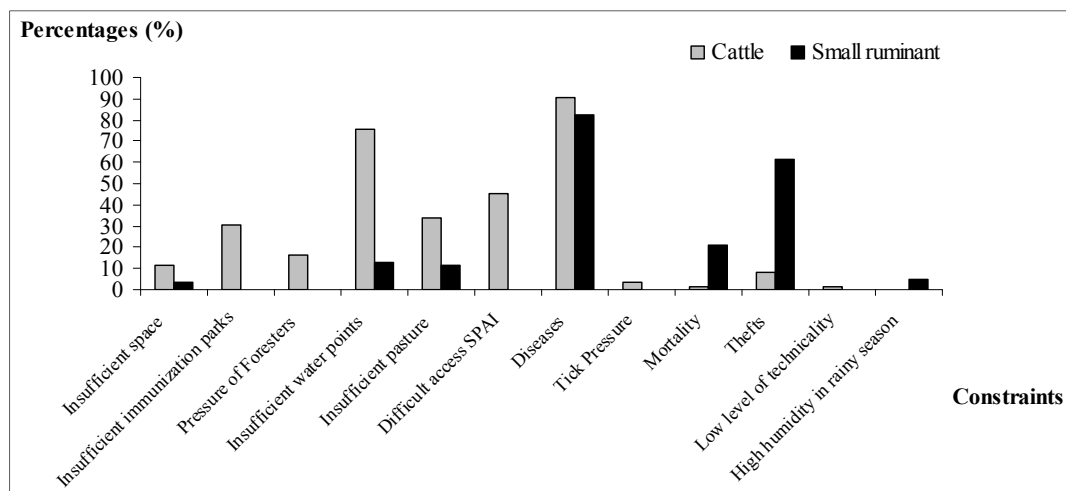


Figure 2. Main constraints of ruminant rearing in pastoral areas of Gaongho.

Figure 3 shows 14 diseases identified by surveyed farmers and among which parasitic diseases are the most dominant, including AAT (96.7%) and gastrointestinal parasitism (58%).

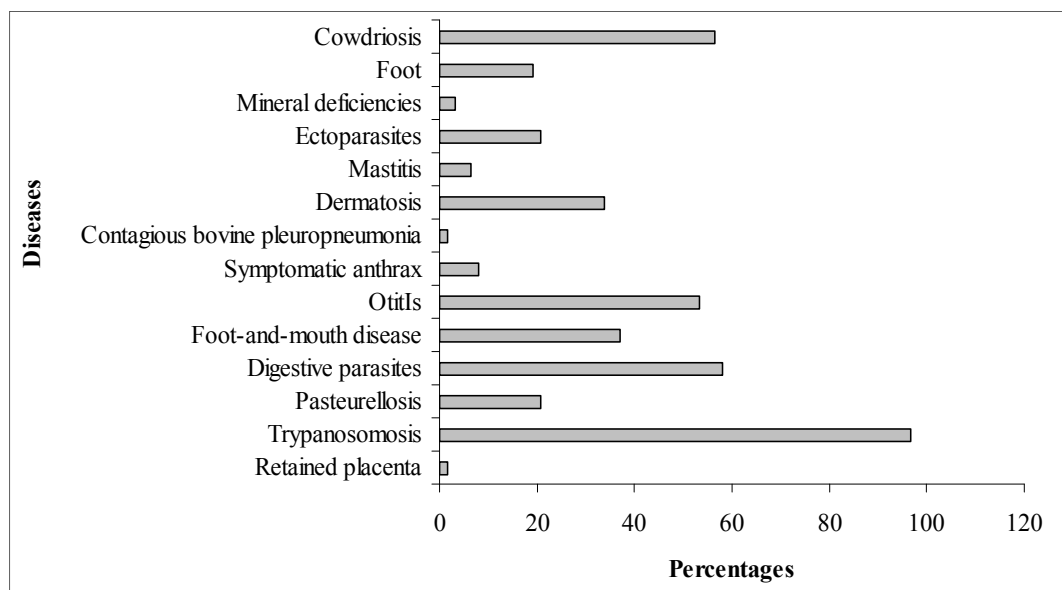


Figure 3. Main diseases of ruminants in the pastoral area of Gaongho.

In most cases, farmers describe animal disease by its manifestations by considering the clinical signs presented by animal. Figure 4 presents the main signs of disease according the respondents. Anorexia (96.7%), stitched hairs (50%), diarrhea (38.7%), weight loss (32.2%) were the most pronounced.

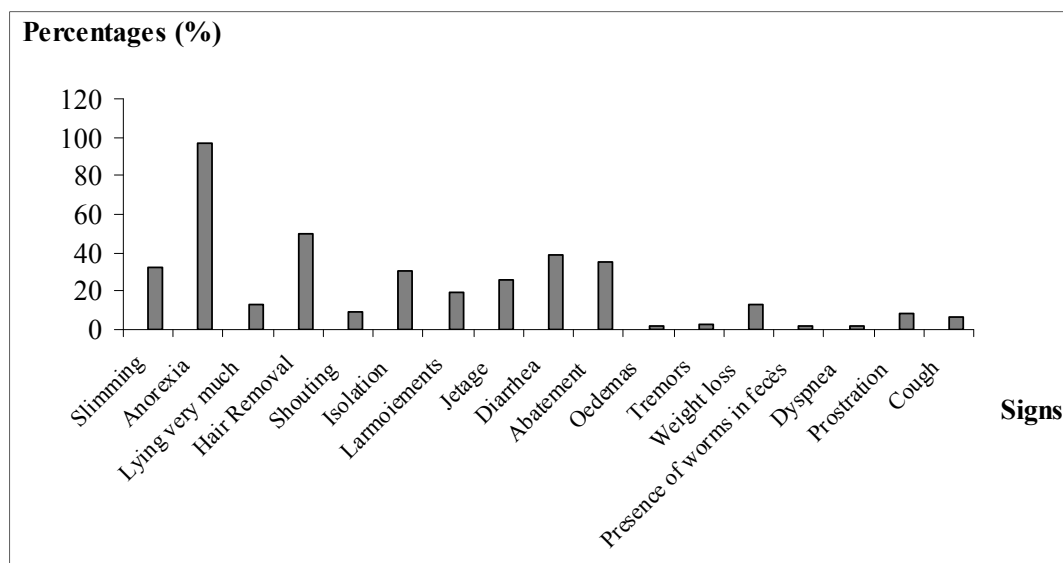


Figure 4. Signs statements by farmers in the description of animal diseases.

For 56.4% of respondents, the maximum infestation level of ruminants to AAT occurs during the winter season (July to August) because of the abundance of vegetation that is favorable to the development and survival of the vectors, transmitting the trypanosomes, pathogen agents of the disease. The consequences of AAT are multiple and affect both production and productivity of ruminants and the costs they incur (cost of treatment products and veterinary acts) for all farmers. Animal mortalities are the most severe consequences of disease in cattle and small ruminant (100%) herds (Figure

5). To treat or control AAT, all respondents use conventional products available from public and private veterinary officers. Conventional products used are isometamidium chloride (Securidium, Trypamidium) and diminazene (Survidim, Vériben). However, 35.4% of respondents practice traditional veterinary medicine to treat their sick animals suffering of AAT. According to these farmers, this action is explained by the high cost of modern treatments, often unavailability of veterinary officers and inaccessibility of farmers' camps or parks to periods of the year.

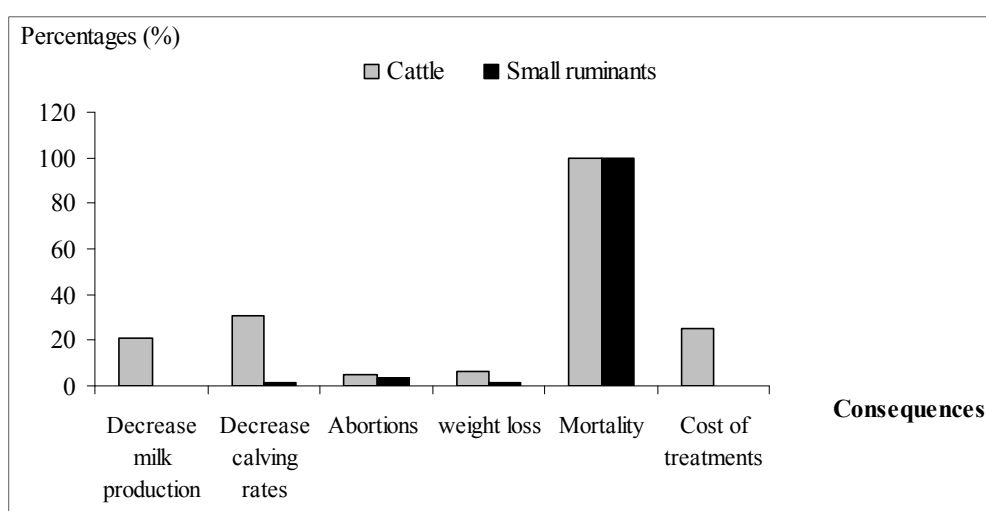


Figure 5. Main consequences of AAT on ruminants in the pastoral zone according the farmers.

All respondents treat their animals against AAT with conventional products available from public and private veterinary officers. Conventional products used primarily are isometamidium chloride (Securidium, Trypamidium) and diminazene (Survidim, Vériben). However, 35.4% of

respondents practice traditional veterinary medicine to treat their sick animals suffering of AAT. According to these farmers, this action is explained by the high cost of modern treatments, often unavailability of veterinary officers and inaccessibility of farmers' camps or parks to periods of the year.

Traditional remedies used in treatment of animal trypanosomosis in pastoral areas of Gaongho are composed of medicinal plants (Table 1), often combined with other ingredients (chili, soumbala) to obtain the final product. A total of seventeen (17) remedies have been indicated by the farmers interviewed as effective against AAT in ruminants. Natural plants involved in these remedies are from eleven (11) families and the most represented are Mimosaceae (27.2%) followed by Anacardiaceae, the Capparacées and Combretaceae (18.1% respectively).

Main parts of the plants used in the preparation of these traditional drugs are the leaves, roots and barks of stems. The modes of preparation and administration are shown in table 1. The preparation is repeated very often and treatment time ranges from one to seven days according remedies and severity of the disease.

4. Discussion

In Burkina Faso, the majority of the population lives in rural areas where their main activities are based on agriculture and livestock to fight food insecurity and poverty. The low incomes that the producers get from these two activities led them to practice traditional medicine to treat themselves and their animals, making the ethno-veterinary a reality in farmer context of the country [7, 8]. Unfortunately, this traditional veterinary knowledge in the pastoral area of Gaongho are transmitted from generation to generation, from mouth to hear, from father to son, without written although some farmers are literate (in French, Fulfuldé, Mossi and Arabic). They are thus subject to a gradual disappearance over time if appropriate measures are not taken to collect these rich traditional skills to their sustainability.

Furthermore, our study is original in the context of Burkina Faso because no similar work has been done before in the pastoral areas of the country with the aim of documenting traditional veterinary practices..

Socio-economic analysis of the farmers surveyed in the study revealed the absence of women, which could be explained by the fact that they are not animals' owners in the pastoral area. One would then think that women rarely own animals in Fulani people because all the surveyed farmers were mainly of Fulani ethnicity. Similar observation was made by Gnanda [9] in the Sahelian region of the country where the auteur observed only one woman out of 150 goat farmers.

The relatively advanced age of farmers of the study allows

us to suppose that they have had time to experiment the efficacy of the traditional veterinary knowledge they practice on their animals in view of the importance of animals they possess. Signs or similar or related groups of signs reported by farmers are especially characteristic of parasitic diseases, in particular of the trypanosomosis which seems the dominant pathology in the area according to farmers. These signs are almost similar to those reported by cattle breeders to diagnose trypanosomosis in Uganda [10].

Farmers report that the rainy season is the period when the level of infestation of the animals is high. This finding indicates that farmers are aware that the presence and development of intermediate hosts (tsetse flies) that are the cause of the disease, depending on climatic conditions (hydrographic network, vegetation and temperature) as reported by Chartier *et al.* [11]. Negative impacts decay by respondents are consistent with existing scientific knowledge relating to constitute a limiting factor in livestock production. Indeed, it is estimated that more than 50 million cattle and 230 million small ruminants are exposed to the risk of AAT in sub-Saharan Africa [12, 4], which nevertheless offer strong fodder and agricultural potentialities yet.

The main impacts of trypanosomosis are an increased mortality rate that can reach 50% infertility, recurrent abortions and reduced milk production (10-20%), meat (5-30%) and animal traction (33%) [13]. For others, disease would lead to disturbances in reproduction [14], productivity losses by falling milk production of 2 to 26% of and animal labor power to 38% [15] and abortions varying between 6% and 19% in high risk areas [14, 16, 17]. In addition, she is an obstacle to the genetic improvement of local breeds by the introduction of exotic animal.

For the treatment or control of ruminant trypanosomosis, the reasons mentioned by our farmers for using the traditional pharmacopoeia corroborate the observations made by Kaboré *et al.* [18] in the region of the Central Plateau of the country. In this region, farmers use anthelmintic medicinal plants to treat small ruminants. To these reasons, we could add the trypanosome resistance to the conventional trypanocide drugs that is increasingly reported worldwide [19] and in Burkina Faso [20]. This fact leads the scientific community and farmers to look at other alternatives of treatments of AAT through the use of medicinal plants that are cultural values generally derived from local natural resources of rural communities.

Table 1. Traditional remedies used in the treatment of AAT in pastoral area of Gaongho.

Plants					
Species (families) (citation)	Local name (in mooré)	Used Parts	Preparation	Modes of administration	Duration of treatment (days)
<i>Mitragyna inermis</i> (Rubiaceae) (9,5%)	Yilga	leaves	Boil well then let cool or crush, then add a little clean water and sift	Drink twice a day (morning and evening)	7
<i>Detarium microcarpum</i> (Caesalpinaceae) (4,7%) + <i>Boswellia dalzielii</i> (Burseraceae) (4,7%)	Kaguedga + Koundryingo	Bark or leaves	Boil well and let cool	drink once a day	2-3
<i>Acacia macrostachya</i> (Mimosaceae) (4,7%)	Zamnega ou Kardga	leaves	Pound well then, add a little clean water and sift	drink once a day	2

Plants		Used Parts	Preparation	Modes of administration	Duration of treatment (days)
Species (families) (citation)	Local name (in mooré)				
<i>Boscia senegalensis</i> (Capparacées) (4,7%)	Lamboaye	leaves	Pound well then, add a little clean water and sift	drink once a day	2-3
<i>Vitellaria paradoxa</i> (Sapotacées) (9,5%)	Taanga	Young leaves + buds	Pound well then, add a little clean water and sift	Drink 1 to 2 times a day	2-3
<i>Guiera senegalensis</i> (Combretacées) (9,5%)	Wiliwiiga	leaves	Pile, add clean water and sift	drink once a day	1-2
<i>Acacia sieberiana</i> (Mimosacées) (4,7%)	Gonponsogo	bark	Boil well then let cool	drink once a day	2-3
<i>Lannea microcarpa</i> (Anacardiacees) (4,7%)	Sanbga	leaves	Boil well then let cool	drink once a day	1
<i>Parkia biglobosa</i> (Mimosacées) (4,7%)	Roanga	bark	Boil well, add a little Shea butter and let cool	drink once a day	2-3
<i>Balanites aegyptiaca</i> (Balanitacées) (14,2%)	Kèglega	bark	Put in a pot, then add an embers on it	Fumigation (especially in calves), 1 to 2 times a day	1-2
		young plants	Boil well, add a little Shea butter and let cool	drink once a day	2-3
<i>Capparis sepiaria</i> (Capparacées) (9,5%)	Silkoatga	leaves	Thoroughly pound with a little chili and “soumbala”, then put in water	drink once a day	2-3
		Roots	Pound well, then put in water	drink once a day	2-3
<i>Anogeissus leiocarpus</i> (Combretacées) (4,7%)	Siiga	leaves	Pile, add clean water and sift	drink once a day	1
<i>Vitellaria paradoxa</i> (Sapotacées) (4,7%) + <i>Pterocarpus erinaceus</i> (Fabacées) (4,7%)	Taanga + Noinga	bark	Boil well then let cool	1 to 2 times the same day	1
<i>Lannea acida</i> (Anacardiacees) (4,7%)	Sanbtoulga	bark	Boil well then let cool	drink once a day	1
<i>Adansonia digitata</i> (Bombacacées) (4,7%)	Tohaiga	bark	Pile, add clean water and sift	Faire boire l’animal 1 à 2 fois par jour	1-2

To fight against AAT, conventional trypanocide drugs used in this study are similar to those used by farmers in Mouhoun river basin in Burkina Faso [21]. In traditional therapy, the trypanocidal plants most used by our farmers are *Balanites aegyptiaca*, *Capparis sepiaria*, *Vitellaria paradoxa*, *Guiera senegalensis* and *Mitragyna inermis*, certainly because of their effectiveness against trypanosomes and their availability in the study area.

As the present study, several natural plants have been reported by other authors as having trypanocide effects on livestock. This is the case of the powder of the leaves or bark of *Terminalia avicennioides* and *Ceiba pentandra* by maceration by African farmers [22], the bark of *Anogeissus leiocarpus* [23] and *Diospyros malabarica* in Bangladesh [24]. In Cameroon, Ngantchou and Nono [25] identified the trypanocidal activities of *Entada abyssinica* *Polyalthia suaveolens*, *Flueggea virosa* and *Enantia chlorantha* in humans. These findings reinforce the claim of Ngorje and Bussman [26] on ethno-veterinary medicine which plays an important role in the management of livestock diseases in African countries. This medicine is the result of innovations generated after several years of practices and adapted to the socio-economic realities of the farmers in their rearing areas [27].

In conclusion, our study shows that farmers have knowledge of ruminant production constraints and diseases in the pastoral area of Gaongho. These farmers are holders of significant knowledge in diseases control of trypanosomosis in ruminants. Their traditional therapeutic practices contain enormous potentialities to complement the modern veterinary

medicine, especially in terms of treatment cost and proximity. Hence, it is very important to carry out an inclusive reflection in order to find consistent and lasting solutions to the constraints of animal production and experimental researches to validate the efficacy of herbal therapeutic recipes proposed by the farmers. This work will allow us to develop at the end improved traditional medicines for farmers. For this, it appears imperative to develop a policy of availability and protection of natural plant species which constitute the raw material for the application of traditional veterinary medicine in the pastoral zone.

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