

# Management of Bovine Trypanosomiasis with Medicinal Plants in Taraba State, Nigeria

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## ABSRTACT

*This work is designed to document ethnoveterinary practices used in the treatment of animal trypanosomosis by Fulani herdsmen in Taraba State, Nigeria. Eight Local Government Areas of Taraba State, Nigeria were selected for the survey. Sixty four herdsmen with good knowledge of livestock diseases and ethnoveterinary practices were interviewed. Data were presented on tables and analysed using simple percentage and frequency count as well as graphs. The results show among others that Fulani herdsmen are vast in ethnoveterinary knowledge. Some of the plants documented to be used by them have demonstrated antitrypanocidal activity, while some of them have not being investigated.*

**Keywords:** Chemotherapy, Ethnoveterinary, Ethnopharmacology, Medicinal plants Bovine trypanosomosis.

## INTRODUCTION

Trypanosomiasis is a complex debilitating protozoan zoonotic disease of man and animals (WHO, 1998). It is responsible for 3 million livestock death annually (Abenga *et al*, 2003, Mulumba, 2003). Annual loss in cattle production due to Trypanosomiasis is between \$1-1.2 billion (Ilemobade, 2009). Trypanosomiasis in livestock has a profound influence on productivity (FAO, 2000). The direct impact on Livestock productivity is low milk yield, low meat off take, low calving rate, high calf mortality and high cost of treatment (Swallow, 2000). The control and eradication of trypanosomiasis is beset with problems of drug resistance, exhibition of antigenic variation which hampers vaccine production, drug toxicity and limited repertoire of drugs in use (Kuzoe, 1993 and Doua and Yapou, 1993). Homidium salts, Diminazene aceturate and Isometamidium used in the treatment of animal trypanosomiasis were introduced in the 1950s and since then no newer drugs have been introduced in the market even with the problem of drug resistance that dates back to the 1960s (Finelle and Yvone, 1962; Jones-Davies and Folkers, 1966; Na' Isa, 1967; Jones-Davies, 1967). According to the FAO (2002), the lack of drugs to treat diseases and infections causes losses of 30 to 35% in the breeding sector of many developing countries, where poor animal health remains the major constraint to breeding. Because of the limitations of the present drugs, searching for active substances of natural origin is necessary. Plants have provided the basis for traditional treatment for different types of diseases and still offer an enormous potential source of new chemotherapeutic agents.

Plants present a spectrum of biological compounds with activities against virus, cancer and parasites. These plants contain compounds mainly secondary metabolites such as alkaloids, glycosides, flavonoids, terpenes and coumarins (Rates, 2001). They have been reported to provide better and cheaper alternatives (Nwude and Ibrahim, 1980, Adewummi *et al.*, 2001, Nok, 2005). A great number of plant derived therapeutic agents have been discovered following leads provided by indigenous Knowledge (Farnsworth *et al.*, 1985, Farnsworth and Soejarto 1991, Cox, 1994). Some examples are aspirin (Acetyl salicylic acid), derived from the willow tree, *Salix spp*, reserpine from *Rauwolfia spp*, Quinine from *Cinchona spp*, and serine from *Physostigma venenosum* (Mann, 1992). Lack of scientific information on their efficacy and safety makes it difficult to integrate these practices into modern livestock's health management, infections and disease prevention programs.

The Fulani's originated from the Arabian Peninsula (de St Croix, 1945). They are found mainly in Central, Western and Northern Africa and hold a large number of livestock populations. Mobile pastoralism is the dominant system practiced by the Fulani pastoralist (Adekunle, Oladele and Olukaiyega, 2002). Fulani herdsmen are believed to be vast in ethnomedicine because they are close to nature and depend mainly on these plants for their health and animals. Herdsmen have a considerable understanding of herbal remedies and their application in disease management (Adekunle, Oladele and Olukaiyega, 2002). In the survey conducted in Kaduna State (Maikai, Abubakar, Salman and Inuwa, 2010), five plants were identified to be used for the treatment of animal trypanosomosis. Some preliminary studies have identified plants with trypanocidal properties (Nok *et al.*, 1993, Asuzu and Chineme, 1990, Adewumi, 2001, Ajagbona, Mikahil, Muhammed and Onyeyili, 2003, Atawodi *et al.*, 2003, Antia *et al.*, 2009, Ene, Atawodi, Ameh, Nnamdi and Apeh, 2009, Inabo and Fathudin, 2011). This is the first report of such survey in Taraba State. The state has a large Fulani population due to the vast grass land and rivers, which are ideal for Livestock production. This work was designed to document ethnoveterinary practices used in the treatment of bovine trypanosomosis by Fulani herdsmen in Taraba State, Nigeria. Information provided will enable further study on the efficacy of the medicinal plants identified.

Taraba State lies largely within the middle of Nigeria and consists of undulating landscape dotted with a few mountainous features. These include the scenic and prominent Mambilla Plateau. The State lies largely within the tropical zone and has a vegetation of low forest in the southern part and grassland in the northern part. The Mambilla Plateau with an altitude of 1,800 meters (6000 ft) above sea level has a temperate climate all year round (Ngex, 2013 [http://nnn.com.ng/?page\\_id=4362](http://nnn.com.ng/?page_id=4362)). With an estimated land area of about 54,428km<sup>2</sup>, the State lies roughly between latitudes 6°25'N and 9°30'N and between longitudes 9°30'E and 11°45'E. It is bordered on the west by Gombe and Plateau States, and by Adamawa State to the northeast and Benue State in the southwest (Ngex, 2013 [http://nnn.com.ng/?page\\_id=4362](http://nnn.com.ng/?page_id=4362)). An international boundary on the east separates Taraba State from the Republic of Cameroun, (Ngex, 2013 [http://nnn.com.ng/?page\\_id=4362](http://nnn.com.ng/?page_id=4362)). It has a population of about 2,688,944 (2005 census report). Rivers Benue, Donga, Taraba and Ibi are the main rivers in the State. They rise from the

Cameroonian mountains, straining almost the entire length of the State in the North and South direction to link up with the River Niger (Ngex, 2013 [http://nnn.com.ng/?page\\_id=4362](http://nnn.com.ng/?page_id=4362)). Livestock such as cattle, sheep and goats are reared in large numbers in the region, especially on the Mambilla Plateau, and along the Benue and Taraba valleys. Other livestock production activities like poultry production, rabbit breeding and pig farming are also undertaken, but not in large number. The major tribes in Taraba State are Jukun, Mumuye, Chamba, Kuteb, Mambila, Wurkum, Fulani, Ichen, Tiv, Hausa and Ndoro. The high concentration of Fulani herdsmen is due to the vast land and rivers that is essential for the survival of their livestock. They are the major owners of cattle, sheep and goat.

## **MATERIALS AND METHOD**

This study is a survey of the management of Bovine trypanosomiasis with medical plants in Taraba State, Nigeria. Taraba State has sixteen Local Government Areas: Ardo Kola, Bali, Donga, Gashaka, Gassol, Ibi, Jalingo, Karim Lamido, Kurmi, Lau, Sardauna, Takum, Ussa, Wukari, Yorro, and Zing (Ngex, 2013). Out of these, eight local government areas were selected purposively for the survey. They are Donga, Gashaka, Gassol, Ibi, Kurmi, Sardauna, Takum and Wukari. The choice of these LGAs was because of the high concentration of Fulani herdsmen in these locations. The period of the survey was between September 2012 and January 2013. The choice of the Fulanis was because of their closeness with livestock that made them vast in ethnoveterinary Knowledge (Adekunle, Oladele, and Olukaiyega, 2002).

Courtesy calls were made to the Fulani community heads (Ardos) with Kola (Valued by Fulanis) with introductory letters containing the purpose of the visit with an appeal for assistance and cooperation from the Fulani herdsmen. The Ardor's then arranged meetings with the herdsmen, in the meeting, herdsmen vast in ethnoveterinary knowledge were nominated for the fieldwork. Sixty four herdsmen with good knowledge of livestock diseases and ethnoveterinary practice from selected locations within the eight Local Government areas were interviewed. The Fulani herdsmen were interviewed using a well-structured open-ended questionnaire and guided dialogue techniques (Jacob, Farah and Ekaya, 2004). The team was made up of two veterinarians, one taxonomist, three botanists (One of which was a Fulani), a microbiologist, a veterinary extension officer (Fulani) and a photographer. The interview was conducted in Hausa and Fulfulde. The herdsmen that participated in the survey were asked to share their knowledge of the disease, symptoms, mode of diagnosis, and ethnoveterinary knowledge used by them to prevent and manage the disease. Information was received on part(s) of the plant used, methods of herbal preparation, mode of administration, dosage estimation, the effectiveness of the herbal remedy and adverse effects observed. Books with documented ethno medicinal plants from some geopolitical zones in the country were presented to them and free consultancy services by the veterinarians and with the promise to organize a training seminar served as a motivation to the herdsmen. A voice recorder was used during interviews with pictures of medicinal plants used by them taken. Herbarium sample of the medicinal plants and

parts used by the respondents were collected, pressed, labelled with their local names where available, the plants were identified by Mr. A. O. Ozioko and further authenticated at the Department of Botany, University of Lagos and the voucher specimens were preserved in ethno-botanical survey herbarium, Nigeria Natural Medicine Development Agency, Lagos. Data were presented on tables and analysed using simple percentage and frequency count as well as graphs.

## RESULTS AND DISCUSSION

Table 1 shows that out of a total of 64 herdsmen (all Fulanis) interviewed, 67.19% of the respondents were found to have remedy for animal trypanosomiasis, while 32.81% had no antitrypanosomal remedy. Majority of the herdsmen interviewed practise extensive management system, while 15.62% of them practise semi-extensive management system (table 2). Figure 3 indicates that 18 plant species from 11 families were documented to be used by 67.19% of the herdsmen for the management of Bovine Trypanosomiasis. The Caesalpiniaceae family has the highest frequency of use with 36.36% and Combretaceae 27.27% (Figure 3). *Khaya senegalensis* was the most frequently used with 20.93% frequency, *Annona senegalensis* and *Prosopis africana* were used by 9.30% of the herdsmen respectively. The common plant parts used as remedies by the Fulani herdsmen interviewed were leaves, stem and root. The mode of preparation of the plants or plant parts was by infusion, decoction, squeezing of plants and pulverized form. Most of the preparations were administered orally by drenching while some of them mixed with salt lick. There was no reported side effect from any of the plants used by the Fulani herdsmen.

The results indicate that majority of the respondents were illiterate, all males and older than 40 years; very few youths were involved in traditional livestock treatment in the study area showing consistency with the study by (Gidey, Mekonen, Gebregergis and Solomon, 2012). Plants comprise the largest component of the diverse therapeutic elements of traditional livestock healthcare practices (Behailu, 2010). Infusion, decoction, squeezing and crushing were the main methods of ethnoveterinary medicine preparation in the area. Grinding or crushing and soaking or boiling different parts of plants are common methods for drug extraction (Deeba, 2009). Stem bark was the most frequently used part while in the survey by (Offiah *et al.*, 2012) the leaves were mostly used. Caesalpiniaceae is the most common plant family reported, having 4 genera with 22.22%. *Khaya senegalensis* is the most frequently used plant species with 20.93%. This is close to the result of the survey by Maikai, Abubakar, Salman and Inuwa (2010) in Kaduna State, Nigeria where *K. senegalensis* was used by 23%, except that in their study only 5 plant species were documented. Some of the plants in use by the herdsmen in Taraba State have demonstrated antitrypanosomal activity in preliminary investigation conducted. Nok *et al* (1993) report the trypanocidal potentials of *Azadirachta indica* leaf extract against *T. brucei*. Antia, Olayemi, Aina and Ajaiyeoba (2009) demonstrate the antitrypanosomal activity of the stem and root bark extracts of *Terminalia superba* and *Khaya senegalensis* and the leaf extract of *Azelaia africana*. *Acacia artaxacantha* exhibited trypanocidal activity

(Adewumi, 2001). *Annona senegalensis* aqueous leaf extract demonstrated trypanocidal activity against *T. brucei* (Abubakar *et al.*, 2005, Ogbadoyi, Abdulganiy, Adama and Okogun, 2007). Atawodi *et al.* (2003) analysed methanol extracts from twenty three plants harvested from the Savannah vegetation belt of Nigeria for in vitro trypanocidal activity against *Trypanosoma brucei brucei* and *Trypanosoma congolense* at concentrations of 4mg/ml, 0.4mg/ml and 0.04mg/ml. Extracts of *Khaya senegalensis*, *Piliostigma reticulatum*, *Securidaca longepedunculata* and *Terminalia avicennoides* were strongly trypanocidal to both organisms while extracts of *Anchomanes difformis*, *Cassytha spp*, *Lannea kerstingii*, *Parkia clappertoniana*, *Strig aspp*, *Adansonia digitata* and *Prosopis africana* were trypanocidal to either *T. brucei brucei* or *T. congolense*. Of the 18 plant species used by the Fulani herdsmen, only 3 did not exhibit antitrypanosoma activity from preliminary investigations, *Lawsonia inermis*, *Maytenus senegalensis* (Wurochekke and Nok, 2004) and *Balanites aegyptiaca* (Atawodi *et al.*, 2003 and Wurochekke and Nok, 2004).

Lack of activity may be because invitro model was used, there may be activity in an animal model where biotransformation of plant materials may convert inactive precursor molecules to active ones, also if the specie of the parasite used in the study is not the prevalent parasite in the areas where the local herdsmen graze, it may not show activity since there is species variation in times of drug susceptibility (Wurochekke and Nok, 2004). The period the plant materials were collected could in part be responsible for the inactivity observed, type of solvent used in the extraction e.g *Guiera senegalensis* aqueous leaf extract demonstrated trypanocidal activity while petroleum ether and chloroform extract extract did not, also the part of plant studied e.g stem bark petroleum ether extract of *Moringa oleifera* demonstrated trypanocidal activity while the leaf extract did not as well as temperature used in the extraction. It has been observed that cold extract produced more activity than extract that were heated, likely the trypanocidal component may be heat labile (Atawodi, 2005). Triterpenes, azanthraquinones and alkaloids have been reported to have high trypanocidal effects (Nok, 2002, Sara, Fredrick, Reto and Joelle, 2004).

**Table 1:** Demographic characteristics of the Fulani herdsmen interviewed in Taraba State

Distribution of respondents characteristics	Frequency (f)	Percentage (%)
<b>Fulani herdsmen age range</b>		
20 – 30	4	6.25
31 – 40	16	25
41 and above	44	68.75
<b>Marital status</b>		
Single	0	0
Married	64	100
Divorce	0	0
<b>Religion</b>		
Islam	62	96.875
Christianity	2	3.125
Traditional	0	0
Atheist	0	0
<b>Years of husbandry</b>		
1 – 5	0	0
6 – 10	11	17.19
More than 10 years	53	82.81

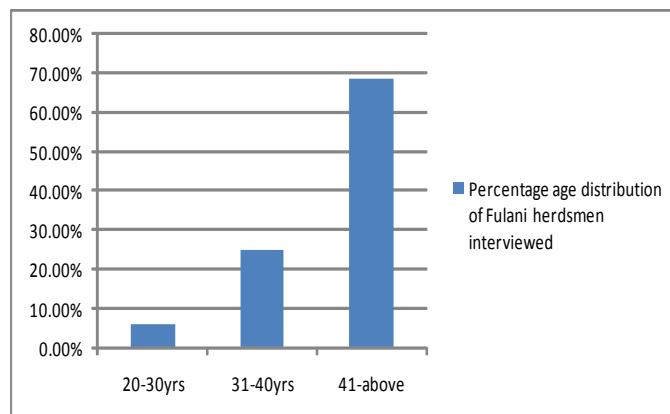
<b>Educational qualification</b>		
Primary school	0	0
Secondary school	2	3.13
Diploma	0	0
Degree/HND	1	1.56
Islamiyya	8	12.50
None	53	82.81

*Source:* Field survey, 2013

**Table 2:** Livestock management system

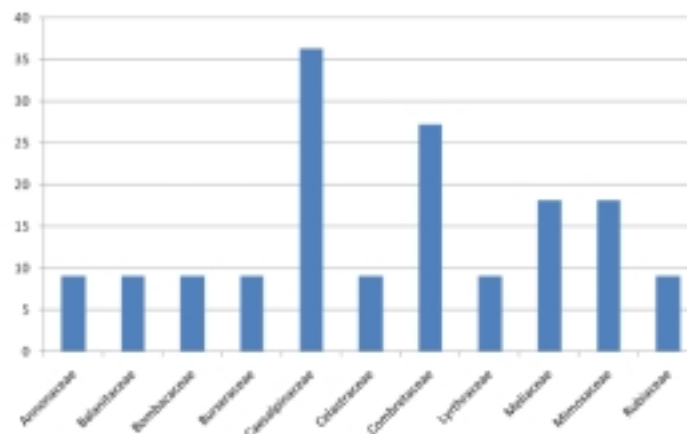
<b>Respondent</b>	<b>Frequency(f)</b>	<b>Percentage (%)</b>
Extensive	54	84.38
Semi extensive	10	15.62
Intensive	0	0

*Source:* Field survey, 2013



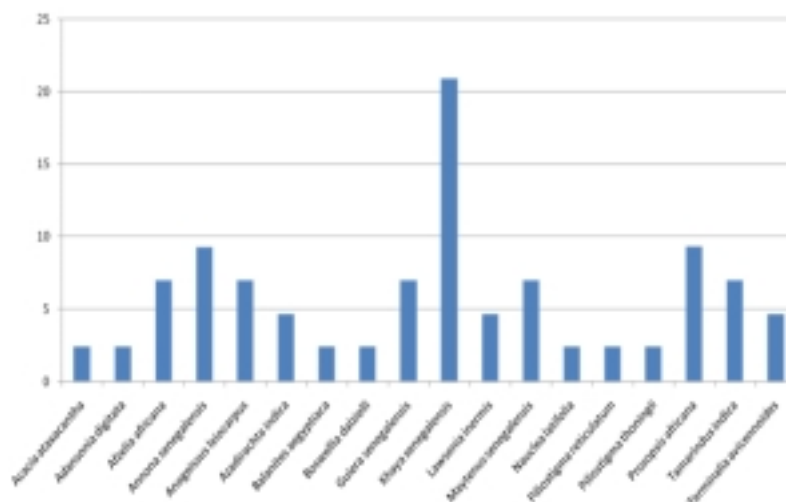
**Figure 2:** Percentage age distribution of Fulani herdsmen interviewed

*Source:* Field survey, 2013



**Figure 3:** Percentage family distribution of medicinal plants used by the Fulani herdsmen in Taraba State to treat animal trypanosomosis.

*Source:* Field survey, 2013



**Figure 4:** Percentage plant species distribution of medicinal plants used by Fulani herdsmen in Taraba State to treat Animal trypanosomosis. *Source:* Field survey, 2013

**Table 3:** Summary of Medicinal plants used in the management of Animal Trypanosomosis by Fulani herdsmen in Taraba State

S/N	Family	Botanical name	Common name	Local name	Frequency of use	Leaves	Stem	Root
1	Annonaceae	<i>Annona senegalensis</i>	PersWild custard Apple	H-Gwandandaji F-Dukuu-hi	4(9.30%)	-	+	-
2.	Balanitaceae	<i>Balanites aegyptiaca</i> (L)	DelDesert date	H-Aduwaa F-Tanni	1(2.32%)	+	+	-
3.	Bombacaceae	<i>Adansonia digitata.</i>	LBaobab	H-Kuka F-Bokki	1(2.32%)	+	-	-
4.	Bursereaceae	<i>Boswelli adalziellii</i> Hutch	Frankincense Tree	H-Ararabi F-Janawhi	1(2.32%)	-	+	-
5.	Caesalpiniaceae	<i>Azelia africana</i>	African Sm.ex.Pers. Mahoganny	H-Kawo F-Pitoo-hi	3(6.98%)	+	+	-
6.	Caesalpiniaceae	<i>Piliostigma reticulatum</i> (DC.) Hochst.	Camels foot	H-Kalgo F-Barkehi Y-Abafe	1(2.32%)	+	-	-
7.	Caesalpiniaceae	<i>Piliostigma thoningii.</i> Schum	Camels foot	H-Kalgo Monkey bread	1(2.32%)	+	-	-
8.	Caesalpiniaceae	<i>Tamar indusindica</i> L	Tamarind	H-Tsamiyaa F-Jabbi	1(2.32%)	-	+	-
9.	Celastraceae	<i>Maytenus senegalensis</i> (Lam)Exell	Confetti tree	H-Namijintsada F-Tultulhi	3(6.98%)	+	-	+
10.	Combretaceae	<i>Anogeissus leiocarpus</i> (DC)Guill&Perr	Axlewood tree	H-Marke F-Kajoo-li	3(6.98%)	-	+	-
11.	Combretaceae	<i>Guiera senegalensis</i> J.FGmel		H-Sabaraa F-Geeloki	3(6.98%)	-	+	-
12.	Combretaceae	<i>Terminalia avicennioides</i> Guill&Perr		H-Baushe F-Kuulahi	2(4.65%)	-	+	-
13.	Lyrthraceae	<i>Lawsonia inermis</i> L	Henna	H-Lalli F-Nalli	2(4.65%)	-	+	-
14.	Meliaceae	<i>Azadirachta indica</i> A.	JussNeem	H-Dogonyaro F-Ganyi	2(4.65%)	+	+	-
15.	Meliaceae	<i>Khaya senegalensis</i>	A. Juss African mahogany	H-Madachi F-Kohi	9(20.93%)	-	+	-
16.	Mimosaceae	<i>Acacia ataxacantha</i> Dc	Flame thorn	H-Saarkakiyaa F-Koora-hi	1(2.32%) 1(2.32%)	+	+	+
17.	Mimosaceae	<i>Prosopis Africana</i> Guill. &Perr	African mesquite Iron tree	H-Kohi F-Kiryaa	4(9.30%)	-	+	-
18.	Rubiaceae	<i>Nauclea latifolia</i> Smith	African peach	H-Tafashiyaa F-Bakure-hi I-Ubuluunu	1(2.32%)	+	+	-

**Key:** H = Hausa, F = Fulani, I = Igbo

**Source:** Field survey, 2013

## CONCLUDING REMARKS

In this present investigation, an attempt has been made to document ethnoveterinary practices in treating Animal trypanosomiasis by Fulani Agro pastoralist in Taraba State, Nigeria. In this study 18 plants species belonging to 11 families were documented to be used by the herdsman to treat Trypanosomiasis. The antitrypanosoma activity reported by studies conducted on most of these plants could support their use in the management of Trypanosomiasis by the Fulani herdsman interviewed. Further studies on the efficacy and toxicity of these plants should be conducted with the aim of discovering new products to complement the existing trypanocide. Sustainable use of these plants should be encouraged.

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