

Ethno-veterinary knowledge and practices amongst Indigenous pastoralists in the Menoua division, west region of Cameroon

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Abstract— The present study entitled “Ethno-veterinary knowledge and practices amongst indigenous pastoralists in the Menoua division, West region of Cameroon” was conducted from January to June 2019. It was aimed at assessing and analyzing more specifically; pastoralists’ perceptions regarding ethno-veterinary practices, major ethno-veterinary practices in the study area, major challenges faced by pastoralists in the field of ethno-veterinary, and pastoralists’ conservation measures for proper management of these knowledge/practices. A descriptive method of statistics was employed where survey questionnaires, FGDs, and field observations were used for data collection. A sample size of 200 respondents was targeted through both purposive and stratified sampling methods.

The major findings indicate that, there is disease prevalence in the study area with over 93.0% of responses. A large majority of respondents (62.0%) use both ethno-veterinary and modern means of treatments while over 26.5% depends only on ethno-veterinary medicines. Pastoralists in the study area proved to have positive attitude and concern for ethno-veterinary medicines and over 58.0% of them judged it to be ‘very effective and fruitful’. Documentation of major ethno-veterinary practices was realized for the following cattle diseases plaguing the study area; Brucellosis, FMD, Cowdriosis, Streptothricosis, Babesiosis, Diarrhoea, Ringworm, Infertility, Ephemeral fever, Bloat, Wound, Poisoning, Fracture, Lumpy skin, Lice, Ticks, and Flies. The major challenges encountered by pastoralists in ethno-veterinary practices were; difficulties in obtaining medicinal plants due to recent physico-demographic challenges, difficulties in preparation and/or usage of dosage, and challenges in storage/preservation, accounting for 93.0%, 89.5% and 82.5% of responses respectively. Despite these challenges, pastoralists in the study area pass down ethno-veterinary knowledge/practices to the younger generation and some of them still conserve medicinal plants in home gardens as effective means to preserve and promote this very important resource pool necessary for man and his society. Nevertheless, according to the respondents, the most important workable solution for the preservation and promotion of ethno-veterinary practices include; documentation of the knowledge/practices, full integration of this system of medicine into the educational milieu, protection of areas containing ethno-medicinal plants, and the promotion of home gardening of medicinal plants.

Keywords— Ethno-veterinary, Indigenous, Knowledge/Practices, Pastoralism.

I. INTRODUCTION

The livestock sector in Cameroon and the world at large, play a significant role in economic development. Generally it is a source of revenue. It serves about 30% of

Cameroon’s rural population, representing 9% of agricultural productions and contributes some 125 billion FCFA to the Gross Domestic Product (Aliou, 2004:11). The role of livestock in ameliorating the nutritional status

of the Cameroonian population cannot be over-emphasized. Furthermore, it generates employment opportunities to millions of Cameroonians like breeders, middlemen in cattle trade, transformers, transporters and butchers. Livestock products, especially cattle beef constitute a significant part of the main diet of more than 60% of the population. Other products like milk, hides and skin are also highly consumed in some parts of the country, especially in the North West and Northern Regions (Aliou, 2004).

In Cameroon, human population is expected to grow by more than 50% by the year 2030 (Aliou, 2004:3). Thus the challenge for the livestock enterprise is to produce food for the growing population. However in Cameroon as well as in most developing countries (especially in Africa), disease remains one of the principal causes of poor livestock performance, leading to an ever-increasing gap between the supply of, and the demand for livestock products. The ever-declining provision of animal health services has resulted in the resurgence of a number of epizootic diseases, undermining the economic efficiency of livestock production in Cameroon.

The high incidence of livestock diseases is one of the principal constraints to African smallholder livestock systems (Guèye, 1997). Therefore Animal health management poses a great challenge to livestock productivity in many developing countries including Cameroon. According to the United Nations Food and Agriculture Organization (FAO), the lack of drugs to treat diseases and infections results in losses of 30–35% in the breeding sector of many developing countries, where poor animal health remains the major constraint to increased production (FAO, 2002). Problems of service delivery to such groups are often exacerbated by a multitude of other factors and these factors have helped to maintain traditional treatment practices in these countries and fostered research on this subject (Muhammad *et al.*, 2005). The extension of conventional medical/veterinary services is particularly difficult and costly in developing world nations where the necessary infrastructure (roads, clinics, labs, cold chains, etc.) is poorly developed and where much of the populace and its livestock reside in remote, rural areas or may be nomadic or transhumant (McCorkle & Green, 1998).

According to the World Health Organization (WHO), at least 80% of the people in developing countries depend largely on traditional practices for controlling and treating various diseases affecting both humans and their animals (Alves & Rosa, 2005; Shen *et al.*, 2010). While the conventional Western opinion of health only considers it to

be the aspect of diseases (caused by micro-organisms, chemical imbalance, nutritional deficiencies, pollution, etc.), the African culture considers the aspect of both diseases and intervention by evil spirits (Toyang *et al.*, 2007). This cultural and religious perception of health is the basis upon which ethno-veterinary practices evolved, hence use of natural products (medicinal plants and by-products), appeals to spiritual forces (rituals, incarnations, and prayers), and manipulation and surgery in traditional African healing practices (Toyang *et al.*, 2007).

Ethno-veterinary medicine is a topic of growing interest among various stakeholders, and is integral to the agricultural practices of many ethnic groups across the globe. The era of treating ethno-veterinary medicine and other ethno-knowledge systems with suspicion and labeling it as myth, superstition and witchcraft, is long gone. The role of ethno-veterinary medicine in livestock development is beyond dispute (Martin *et al.*, 2001).

Ethno-veterinary knowledge/practices continue to be recognized at a global level as a pertinent resource for livestock development and have gained institutional backing from world organizations such as OIE and FAO (Wanzala *et al.*, 2005). However, a considerable proportion of ethno knowledge and traditional animal health care practices in native and animal stock raising communities remain undocumented despite a growing tendency to integrate them into more widely used primary animal health care systems in rural and peri-urban communities (*ibid.*). Therefore, much effort is needed in research, documentation and integration of these practices in livestock development programs of developing countries (Mathias and McCorkle, 1997). As wide spread as it is, the practice of ethno-veterinary medicine has lagged behind that of its counterpart (modern veterinary medicine) many times partly because, the practice was secretly done and its information hidden in the gray literature (Mathias, 2004). Despite the fact that ethno-veterinary practices and Western science have their own strengths and limitations, the two should complement each other in addressing livestock health issues. However, ethno-veterinary practices are sketchily recorded in books (Abegaz and Demissew, 1998) and are stored in the same fashion as it is transmitted by means of practice or in the form of artifacts handed from father to son or from mother to daughter (Kokwaro, 1993; Patricia, 2001). Because traditional, native, medical practices have been in most cases either discontinued or greatly modified, there is much about them that will never be known (Lawrence, 1998). The storage of the knowledge is solely depended

on the collective memory of just a few entrusted persons within communities (Abegaz and Demissew, 1998).

Also, the remedies for many livestock diseases still remain unknown in certain communities despite their daily usage by livestock owners in other parts of the country. In the Western highlands, Guinea savanna and Guinea Sahel Regions of Cameroon for example, the Fulani make up the bulk of the pastoralists and have a long history in the use of traditional medicines (Toyang *et al.*, 1995). All the indigenous knowledge regarding livestock in Cameroon is found among the Fulani (*ibid.*). They have knowledge of the epidemiology and the gross pathology of the diseases and ailments that affect their livestock, especially cattle. However these remedies and various other solutions still remain for subsequent dissemination to other parts of the country and beyond.

This study aims to assess, analyze and document the various ethno-veterinary knowledge and practices applied by pastoralists and to explore the requisites for effectual integration into livestock disease management in the Menoua Division. It focuses on the following four areas: (i) examine the perceptions of the pastoralists towards

ethno-veterinary practices. (ii) Identify and document the major ethno-veterinary knowledge and practices used by pastoralists for maintaining the health and boost productivity of livestock in their area. (iii) Identify and assess the major challenges and drawbacks that make the pastoralists unable to explore, develop and document the existing ethno-veterinary knowledge and practices. (iv) Assess pastoralists' conservation measures for proper management of ethno-veterinary knowledge/practices and explore the kinds of support, needed to make these conservation measures more resilient.

II. METHODOLOGY

2.1 The study area

Menoua is one of the eight divisions of the West Region of Cameroon. It is a very old administrative unit made up of six sub-divisions. They include; Dschang, Fongo-Tongo, Nkong-Ni, Penka-Michel, Fokoue and Santchou. It is located between latitudes N5°12' and longitudes E 9° 21'. The division spreads over 1380km².

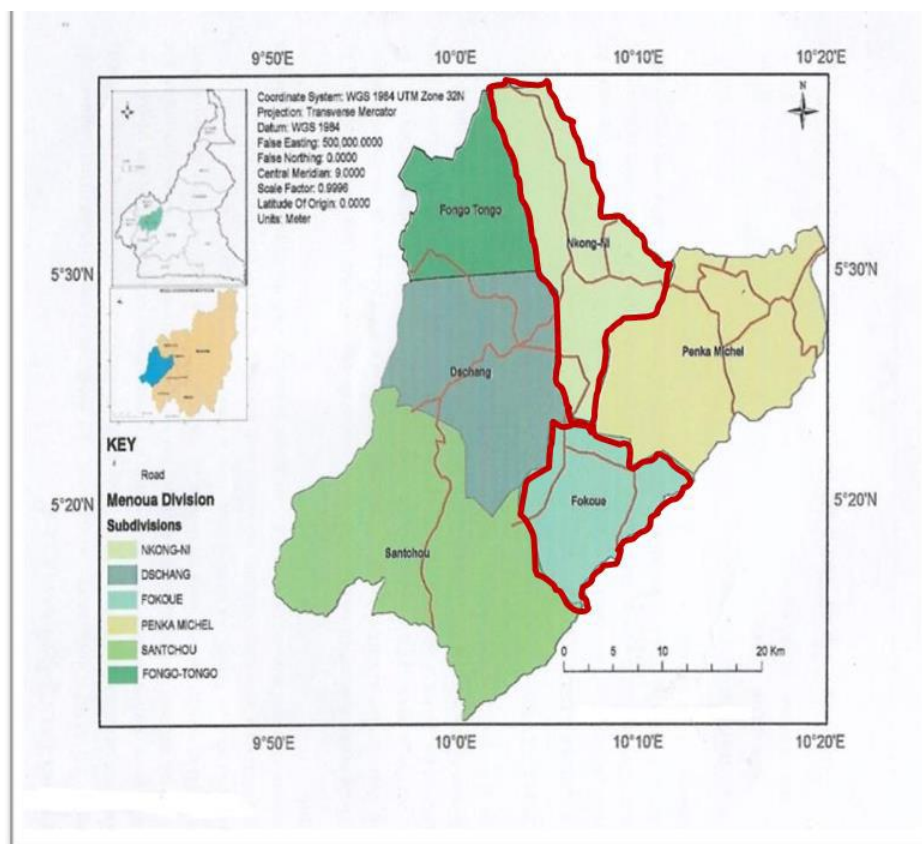


Fig.1: The map of Menoua Division showing the various sub-divisions

Source: Modified from (Kanla, 2014).

1.1. Sampling procedure and data collection

Both probability and Non-probability sampling methods were employed in this study. Firstly, a Judgement or Purposive (Non-probability) sampling method was used to select the sub-divisions covered in the study. This selection was done based on cattle productivity and disease prevalence within the menoua division. As seen previously in Table..., the sub divisions with highest cattle population are Kong-ni and Fokoue. According to statistics from the divisional delegation of MINEPIA for Menoua, these sub-divisions are also leading in terms of cattle diseases based on the frequency of veterinary services needed within the zone. Livestock population and disease prevalence were used as priority factors for the selection because ethno-veterinary studies can only be effective or have a real impact where livestock diseases and cattle population are dominant in order to witness a significant effect of practices/treatments on the cattle herds.

The second stage of selection constituted a probability sampling method. Here, Stratified sampling was used to

determine the sample size of the target population. The population of pastoralists in the target sub divisions are distributed in 3 major ardorates with two in Kong-ni and one in Fokoue. These ardorates have specificities especially in availability and types of medicinal plants and various ethno-veterinary practices. Based on the variation in the measurement of responses among these strata (ardorates), a stratified sampling method was therefore used. This method was also used in this study in order to improve the accuracy and representativeness of the results by reducing sampling bias. According to statistics from the senior divisional office for Menoua, pastoralists constitute 0.5% and 0.25% respectively of the total population of Kong-ni and Fokoue. This means from the 2005 population census, the population of pastoralists in Kong-ni and Fokoue are respectively 391 and 48 inhabitants. The following table summarizes the population of pastoralists in the three major ardorates and their respective sample sizes chosen for this study.

Table 1: Sample size distribution in the study area.

Name of Ardorate	Total number of pastoralists	Sample size	Percentage validity
Bafou	235	110	47.0%
Kong-ni	156	70	45.0%
Fokoue	48	20	42.0%
TOTAL	439	200	45.5%

From Table 1 above, 200 pastoralists were selected from a total population 439 in the study area through a stratified sampling technique. This gives a percentage validity of 45.5% for the target population.

1.2. Statistical analysis

Data collected were analysed with the help of two computer software programs; Statistical Package for Social Sciences (SPSS) version 24.0 and Microsoft office Excel 2010. The descriptive statistics was used for the analysis.

Descriptive method is appropriate for this study because, the study is concerned with the assessment of

perceptions and documentation of practices on a phenomenon (ethno-veterinary medicines) at present. The descriptive statistics made use of frequency distribution and percentages. To facilitate the interpretation, results were illustrated through the use of tables, pie charts, bar charts and some demonstrative photos from field observations.

III. RESULTS AND DISCUSSION

2.1 The socio-economic characteristics of pastoralist households:

Table 1: Distribution of Respondents by Socio-economic characteristics

Variable	Frequency	Percentage
Sex of Respondent		
Male	200	100.0
Female	0	0.0
Age of Respondent		
0 – 19	4	2.0
20 – 39	61	30.5
40 – 59	90	45.0
60 and Above	45	22.5
Household size		
1 – 5	31	15.5
6 – 10	51	25.5
11 – 15	76	38.0
16 and Above	42	21.0
Marital status		
Married	171	85.5
Single	24	12.0
Divorced	5	2.5
Widow/Widower	0	0.0
Level of Education		
Non lettered	118	59.0
Primary education	57	28.5
Secondary education	18	9.0
Higher education	7	3.5
Main livelihood activity		
Cattle rearing only	31	15.5
Cattle rearing and crop cultivation	166	83.0
Cattle rearing and trading	3	1.5

Statistics from Table 2 reveals that, the age group of 40 – 59 years is the highest represented (45.0%) in pastoral activities in the study area. The proportion of youths within an age limit of 20 – 39 years, which stands at 30.5%, is also noticeable. This clearly shows that, youths

are moderately implicated in cattle rearing. All the respondents were Males. Such result could be explained, based on the nature of the activity. Majority of the respondents (38.0%) had household sizes between 11 – 15 persons. This is true especially amongst the fulanis (who

form a bulk of the respondents) where there is high polygamy and dependency rates thus corresponding with literature from Encyclopedia of world cultures (2018).

A large majority (85.50%) of respondents were married with a minimal record of divorce cases (2.50%). Results also reveal that, there is high level of illiteracy amongst the respondents. This is similar to the results of (Kelly *et al.*, 2016) regarding low level of education amongst the pastoralists in the Western highlands in general. Furthermore, a large majority (83.0%) of respondents earn their living from both cattle rearing and crop cultivation.

2.2 Perceptions of pastoralists in the study area regarding Ethno-veterinary medicines

Respondents were asked if they experience disease problems in their grazing area. According to statistics, a great majority of them (93.0%) responded in the affirmative. Further discussions with focus group members

revealed that cattle diseases is becoming a more challenging issue just like its counterpart of insufficient and poor quality pasture.

Respondents further said these constraints especially that of cattle diseases have led to a decrease in quality and quantity of cattle production. In fact 32.5% of them confirmed a decrease in the trend of cattle production for the past decade. This further corresponds with results of Ngalim (2015).

Respondents were further asked concerning the various measures they have been using to reduce the impact of these diseases. They admitted their awareness and utilization of ethno-veterinary medicines. In fact a large majority of respondents (62.0%) use both ethno-veterinary and modern means of treatments for both curative and preventive purposes to keep their animals healthy. This is clearly shown in Figure 4 below.

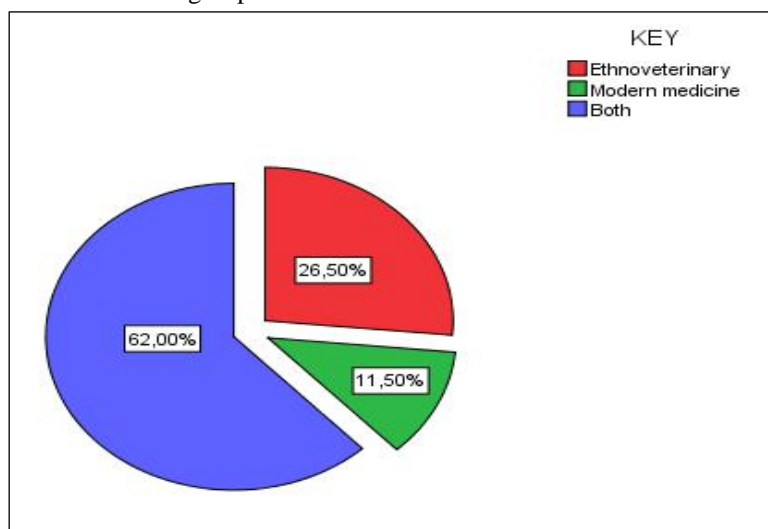


Fig.2: Distribution of pastoralists based on veterinary means resorted to

Figure 6 above clearly demonstrates that pastoralists in the study area are fully aware and well acquainted with ethno-veterinary medicines. They mostly use the latter and its corresponding counterpart (modern medicine) in reducing disease impact in their herds. This corresponds with literature of some authors including; (Abegaz & Demissew, 1998.), (Martin *et al.*, 2001.), (Mathias, 2004.), (Toyang *et al.*, 1995.) regarding the complementariness of

both ethno-veterinary and modern medicine in managing animal health problems.

Pastoralists in the study area did not only admit their awareness and concern for ethno-veterinary but also provided a scale to judge how they value and confirm this system of medicine in terms of efficacy. The following table presents this phenomenon.

Table 3: Rating Ethno-veterinary medicines in terms of effectiveness

Effectiveness of EVM	Frequency	Percentage (%)
Less effective	09	4.5
Averagely effective	75	37.5
Very effective	116	58.0
Total	200	100.0

From Table 11, over 58.0% of respondents said ethno-veterinary medicines when used are very effective and fruitful. Focus group members confirmed that this system of medicine is very proficient in efficacy if properly used. This is similar with results of some authors who said that “Best results from medicinal plant preparations can only be obtained when the users are able to judiciously harvest, process, store, preserve and utilize the preparations (Levy, 1988:6-16; Lötschert and Beese, 1983:12) and establish botanic gardens of endangered medicinal plants (Gbile, 1991:10; Spore, 1992:5)”. Therefore it can be said with full certainty that pastoralists in the study area have a positive attitude and concern for ethno-veterinary medicines/practices thus closely related with results of Schillhorn Van Veen (1997), who confirmed that ethno-veterinary medicine is increasing becoming mainstream.

2.3 Major Ethno-veterinary knowledge and practices used by pastoralists in the study area in maintaining animal health.

2.3.1 Livestock diseases prevalent in the study area

The table below gives a summary of all major diseases affecting animal health listed by the pastoralists in the study area. In addition to their scientific and common names, we preferred listing the names in Fulfulde used by the pastoralists given that a great majority of them were Fulanis. They make up the bulk of the pastoralists in Cameroon and have a long history in the use of traditional medicines (Toyang *et al.*, 1995).

Table 4: Diseases affecting animal health in the study area listed by the pastoralists

S/N	Cattle Disease and vectors (common name/scientific name)	Vernacular name (Fulfulde)
1.	Brucellosis	<i>Bakkaale</i>
2.	Foot and Mouth Disease (FMD)	<i>Mboru</i>
3.	Worms	<i>Bo'le</i>
4.	Cowdriosis/Heartwater	<i>Nghabbu</i>
5.	Streptothricosis	<i>Ngunya</i>
6.	Babesiosis	<i>Sammore</i>
7.	Diarrhoea	<i>Saarol</i>
8.	Ring worm	<i>Saanikoje</i>
9.	Infertility	Male: <i>Tablingo</i> Female: <i>Rimaare</i>
10.	Epheral fever	<i>Dasi/Pappooje</i>
11.	Bloat	<i>Guttel</i>
12.	Wound	<i>Nawnaare</i>
13.	Poisoning	<i>Tooke</i>

14.	Fracture	Yebre
15.	Lumpy Skin Disease (LSD)	Bollo/Gar'sa
16.	Lice	Tend'di
17.	Ticks	Kooti/Duche
18.	Flies	Bokkaaje

It is important to note that these findings had no significant difference with livestock diseases recorded in the North West region of the country according to authors of (Cameroon Agrodok 44 on: Ethno-veterinary medicines, 2007). This indicates that the Western highlands in general have common disease cases. It is clearly explained by its common climatic and agro-ecological conditions. This was further confirmed by results of the HPI and CIPCRE projects with interventions in the NW and West region of the country respectively.

2.3.2 Applicable Ethno-veterinary measures used by pastoralists in the study area to treat disease cases.

Focus groups were used in a similar manner to understand and document various ethno-veterinary practices used in treating and managing the above mentioned diseases in sub section 4.3.2. By discussing these diseases and their curing agents with group members, we wanted more certainty, reliability, accuracy, and limited ambiguities/confusions in the results. The type and manner of treatment given to cattle by grazer 'A' could be different from that given by grazer 'B'. However what is common between them in type and manner of treatment should be a point of interest and useful to the society if both come together. This is the foundation why focus groups were useful specifically for this purpose.

Table 5: List of cattle diseases plaguing the study area and their corresponding ethno-veterinary treatments used by pastoralists.

Disease/vector	Perceived cause by pastoralists	Signs and Symptoms by pastoralists	Treatment by pastoralists (medicinal plant, preparation and administration)
Brucellosis (<i>Bakkaale</i>)	Abortion in female and infertility in both male and female cattle	-Abortion after the first few months of pregnancy -Swelling and hardening of the testes of the bull	<i>Khaya anthoteca</i> /African mahogany / (<i>Kahi</i>) <i>Citrus medica</i> / Citrus limon / (<i>Lemuhi</i>) <i>Kigalia 233arinose</i> / Sausage tree / (<i>Jillarehi</i>) -Grind the back of any of the above plant species and mixed with salt to feed the animal.
FMD (<i>Mboru</i>)	Disease gotten from other herds or from pasture	-Blisters inside the mouth and sometimes on the feet. -Excessive secretion of foamy saliva.	<i>Englerina lecardii</i> / Sattaga bowal / (<i>Sottore bawshi</i>) -Pound the leaves and stems of <i>Englerina lecardii</i> mix in boiled water and administer to cattle. <i>Cadaba 233arinose</i> / Cadaba bush / (<i>Lalle</i>) -As for (<i>Lalle</i>), pound content and dry. Then mix with red oil and apply on the feet of the animal for both curative and preventive treatment. <i>Erythrina eriotricha</i> / Coral tree / (<i>Bobillohi</i>)

			-Grind the bark of (<u>Bobillohi</u>) into fine powder. Then mix with salt and administer orally to cattle.
Worms (<u>Bo'le</u>)	Animals get worms from pastures and milk	-Animal is pale and weak even though it feeds well -Swollen stomach of inflammation of neck -Diarrhoea	<i>Vernonia amydalina</i> / Bitterleaf / (<u>Swaaka</u>) -Harvest and macerate the leaves in water and filter. The mix with limestone and administer to cattle <i>Solanum dasiphillum</i> / African eggplant / (<u>Ngawtahonn walde</u>) -Harvest and macerate the fruits in water and filter. Then administer orally to the animal.
Cowdriosis/Heartwater (<u>Nghabbu</u>)	Germs considered to be evil spirit	-Rise in temperature (fever) -Shivering and continuous movement of the limbs, head, ears etc. -Nasal discharge	<i>Plectranthus assurgens</i> / (<u>Dutalhi</u>) -Grind into fine powder and animals should feed on it in their salt. <i>Dichrostachys glomerata</i> / Sicklebush / (<u>Burli</u>) -Grind the leaves into powder and mix with some honey and administer orally to cattle.
Streptothricosis (<u>Ngunya</u>)	Germs which are considered to be evil spirits	-Skin rashes mostly on the back of the cattle -Bleeding surface on the animal	<i>Red hot iron, Limestone or wood ash</i> -Cauterize the skin around the affected area. The purpose of this is to prevent the spread of the disease. Then Soak limestone, mix well and apply all over the affected areas. <i>Engine oil</i> -Cauterize the skin around the affected area and rub engine oil on the affected parts.
Babesiosis (<u>Sammore</u>)	Germs which are considered to be evil spirits	-Severe fever -Muscle tremors -Weight loss	<i>Hallea inermis</i> / (<u>Koli</u>) <i>Khaya anhetica</i> / African mahogany / (<u>Kahi</u>) <i>Crateva adansonii</i> / Sacred barna / (<u>Lamdambaali</u>) <i>Dalbergia rufa</i> / (<u>Gadawuro</u>) -Collect the barks, leaves and stems of the plants. Then grind into powder and drink animal wih. <i>Crossopteryx febrifuga</i> / African bark / (<u>Rimajogoohi</u>) <i>Khaya anhetica</i> / (<u>Kahi</u>) -Boil together the barks of these plants in water, cool and then filter. Administer concoction to sick animal.

Diarrhoea (<i>Saarol</i>)	Worms, changes in diet, poisons and dirt. All are capable of causing diarrhoea	-Purging or frequent loss of stool -Animal is weak and has no appetite -Animal becomes dehydrated and loss weight	<i>Khaya senegalensis</i> / (<u>Kahi</u>) -Harvest the fresh bark, grind and macerate in water. Then filter and drink animal with. <i>Acacia absus</i> / Acacias or wattles / (<u>Pip-pil</u>) -Collect the leaves and grind. Then mix with salt and administer orally to animal.
Ring worm (<i>Saanikoje</i>)	Not Known	-Round patches of hair lost -Patches spread slowly all over the body of the animal.	<i>Bridelia ferruginea</i> / <i>Bridelia</i> / (<u>Buduudi</u>) -Boil bark of plant mixed with limestone. Administer orally to animal.
Infertility: Male: (<i>Tablingo</i>) Female: (<i>Rimaare</i>)	Infected uterus in cows, cause not known for bulls	-The cow does not become pregnant -Miscarriages	<i>Arachis hypogea</i> / Groundnut / (<u>Biriji</u>) -Grind and combine mixture with fresh milk and administer to cow orally.
Epheral fever (<i>Dasi/Pappooje</i>)	Not known	-Shivering of the body of animal -Paleness	-Tether animal and prevent it from drinking water for some few days (maybe 1-3days) and rub perfume on the animal's muzzle, forehead and on the back -Soak the fresh feces of a cow in water and wash the entire body of the animal.
Bloat(<i>Guttel</i>)	Eating in fresh succulent pastures	-The stomach is large on the left side -The animal stops eating and chewing cut.	<i>Khaya anhoteca</i> / (<u>Kahi</u>) -Boil the fresh bark in water and filter. Then administer orally to the cattle. - <i>Fresh milk</i> : Drink the animal some fresh milk. - <i>Running</i> : Keep the animal running until it passes or breaks out wind continuously. - <i>Edible oil</i> : Drink the animal any form of edible oil (red oil, manyanga etc.) - <i>Feeding</i> : As a preventive measure, feed the animal some dry grass early in the morning before taking them out for fresh pasture. Make sure the animals do not only feed on one type of pasture alone. Rotate grazing area within the day. Do not also let animals go for long without food.
Wound(<i>Nawnaare</i>)	Physical injuries like accidents, bites from other animals etc.	-Red and swollen skin around the wound -Bleeding, pus etc. -Dirt in the wound	<i>Aspilia Africana</i> / <i>Aspilia</i> / (<u>sonyo-nai</u>) -Squeeze and apply the liquid on the wound. <i>Emilia coccinea</i> / Tassel flower / (<u>Ndanhora</u>) - Squeeze and apply the liquid on the

			wound. <i>Aloe barbadensis</i> / Aloe vera /(Njaboa) -Cut off a leaf from the above specie and allow the sap to drip. Apply sap on the wound area
Poisoning(<i>Tooke</i>)	Eating plants which are poisonous in nature (e.g poisonous plants), Chemicals such as pesticides discharged in water bodies, Bites from snakes or other poisonous animals.	-Bloating of stomach -Groaning, bleating -Weakness -Shivering, convulsions -Foaming from the mouth -Difficult breeding, sweating	- <i>Charcoal, milk, water</i> : Grind charcoal and mix with fresh milk and water. Then administer orally to the cattle.
Fracture(<i>Yebre</i>)	Fall of the animal, Fight between animals, Accident etc.	-Affected limb is painful -The animal limps or lie down and is unwilling to wake up -The fractured bone can be felt or cracking sounds can be heard when the bones are moved.	- <i>Strips of wood, Piece of cloth, butter</i> : First restrain the animal and then wash the affected area with water and remove matted hair. Align bones back into their normal position. Rub butter around the affected area. Wrap the piece of cloth around the area to keep bones in position. Gently place the strips of wood in the area and tie gently with a bandage without restricting blood flow.
Lumpy Skin Disease (<i>Bollo/Gar'sa</i>)	-Poor nutrition	-Animal is pale in appearance -Animal does not graze like other animals in the herd	<i>Phoenix reclinata</i> / Date palm / (Ba'li dalle) -Boil with fresh milk and salt. Then filter and administer orally to animal
Lice(<i>Tend'di</i>)	Poor hygiene	-The animal scratches itself, it's restless and irritated. -Lice can be seen often at the base of the tail, neck and ear.	<i>Tephrosia vogelii</i> / Fish bean -Pound leaves and mix with wood ash solution. Bath or spray the infected animal with the solution.
Ticks(<i>Kooti/Duche</i>)	-Bushy nature of grazing area.	-Ticks mostly inside the ear, base of the tail and neck, between the legs. -Constant irritation and discomfort.	<i>Adenium obesum</i> / Desert rose /(pomporo) -Crush the specie and mix in water. Then wash the affected animal with the preparation. This specie of plant is very poisonous and must be handled with a lot of care.
Flies(<i>Bokkaaje</i>)	-Bushy environment or surrounding, Grazing area surrounded by forests	-Animal will scratch, rub, bite or lick the infested area. -Local irritation and	<i>Azadirachta indica</i> / Nimtree /(Dogonyaro) -Pound the seeds until they turn sticky. Squeeze to remove all the oil out of the seed. Rub the oil on the animal to repel flies

		discomfort.	and other biting insects.
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2.4 Challenges encountered by pastoralists in the field of ethno-veterinary.

The main challenging areas faced by pastoralists in exploring, developing and promoting ethno-veterinary knowledge and practices in the study area include: availability, preparation/usage and storage/preservation of medicine, knowledge and/or practices.

2.4.1 Challenges in obtaining medicinal plants

A large majority of respondents (88.14%) obtain their medicinal plants from both the forest and grassland. According to members of focus group, pastoralists sometimes have to travel far from their homes just to fetch a medicinal plant. Even this far, they sometimes do not get all the combination of plants necessary for a particular treatment. “We have to sometimes call relatives from neighboring villages to search for us certain medicinal plants which are absent here in our area” said by some members. The pastoralists further attest to the fact that

Table 6: Using ethno-veterinary medicines and the main challenges involved

		If no, what is/are the main challenge(s) you face?				
		Difficult to prepare	Time consuming	Less effective	Sometimes harmful	Total
Do you find it easy in using ethno-veterinary medicines?	NO	94 (47.0%)	72 (36.0%)	9 (4.5%)	4 (2.0%)	179 (89.5%)
	YES	10 (5.0%)	9 (4.5%)	2 (1.0%)	0 (0.0%)	21 (10.5%)
TOTAL		104 (52.0%)	81 (40.5%)	11 (5.5%)	4 (2.0%)	200 (100.0%)

From Table 18, over 47.0% of pastoralists do not find it easy in using ethno-veterinary medicines as a result of difficulties in preparing the concoction. This was confirmed by focus group members who said it takes many combinations just to prepare a single remedy for a given problem. This further ties with literature of (Fre, 1989.) and (Wolfgang, 1983.), regarding the difficulties in preparing and using ethno-veterinary medicines. Medicinal plants that are used in powder forms need the sun for its preparation. Pastoralists sometimes run for days without good sunlight in their area especially during the rainy

these medicinal plants are not readily available nowadays. This phenomenon contradicts with literature of some authors including; (Marcus, 1992.), (Rangnekar, 1997.), (Nuwanyakpa & Toyang, 1994.) etc. who argued that ethno-medicinal plants are readily available. This could be true fact because the literature of these authors dates back approximately 2 - 3 decades ago where the availability of medicinal plants was not jeopardized by climate change and other anthropogenic factors as compared to nowadays.

2.4.2 Difficulties in preparation and usage of ethno-veterinary medicines

Respondents were asked if they find it easy in preparing and using ethno-veterinary medicines. A large majority of over 89.5% responded in the negative saying ethno-veterinary medicines have very difficult preparation and usage methods. Again, the following cross table throws more light on the phenomenon.

season which makes it cumbersome to treat their animals on time. Another difficult aspect in the preparation of ethno-veterinary medicine is the materials used. Members pointed out that materials such as mortar, bags, sieve, tray, buckets/basins, pot, fuel wood etc. are the most frequently used in the preparation of their medicines but are however difficult to obtain sometimes.

2.4.3 Challenges faced in storage or preservation.

As highlighted in literature, pastoralists in the study area confirmed that if proper measures are not taken, the knowledge of ethno-veterinary they have in their store can be of risk to disappear in the nearest future. This is proven by the fact that a great majority (92.5%) according to field statistics said they do not store this knowledge in any form be it in books, tapes etc. They pass down this knowledge just in the form of “DOING BY SEEING” to the younger generation. The principal reason for this deficiency could be the limited level of education amongst the pastoralists. It was previously shown that a large majority of over 59.0% of respondents were uneducated or unlettered.

Apart from the knowledge, ethno-medicinal plants also suffer deficiencies in preservation. Respondents were asked if they preserve these plants in home gardens. A large majority (82.5%) of respondents do not preserve the medicinal plants they use for the treatment of their animals in home gardens. This is highly risky given the recent conditions of climate change, deforestation, habitation and peasant activities as earlier mentioned.

2.5 Conservation measures explored by pastoralists and various support systems for ethno-veterinary knowledge/practices in the study area

2.5.1 Pastoralists’ conservation measures for ethno-veterinary medicines and practices in the study area.

Despite the challenges faced by pastoralists in ethno-veterinary, they have not folded their arms. They have devised several measures to conserve, protect and promote this very important resource pool used for the daily treatment of their animals. Over 87.5% of respondents affirmed that they share the knowledge of ethno-veterinary with their children and other neighbors. Furthermore according to field statistics, all 87.5% or respondents who shared their knowledge did that orally. They transfer or pass down this knowledge by means of explanation and demonstrations. By doing this, they can guarantee a certain level of storage or preservation and promotion of ethno-veterinary knowledge/practices.

Again as seen earlier, some pastoralists (13.5%) have gone as far as preserving ethno-medicinal plants in home gardens. Some of these plants which constitute mostly herbs can be seen around their back yards, home gardens and near farms. According to this group of pastoralists, ethno-medicinal plants are fast disappearing and as such needs to be cultured. “We do not always want to travel far to the bush each time just to go fetch herbs when we ourselves can grow it” some of them said.

2.5.2 The Role of the Government and NGOs in ethno-veterinary promotion in the study area.

The role played by the Government and Non-Governmental Organizations in promoting ethno-veterinary medicines and practices in the study area cannot be left out in this study.

Table 7: Effectiveness of Government measures for ethno-veterinary practices in the study area

Do you think the measures taken by the Government to conserve and promote ethno-veterinary knowledge/practices are affective?				
		YES	NO	Total
Are you aware of any Government programme and/or project, addressing the question of EVM, knowledge/practices in your area?	YES	18 (9.0%)	25 (12.5%)	43 (21.5%)
	NO	42 (21.0%)	115 (57.5%)	157 (78.5%)
TOTAL		60 (30.0%)	140 (70.0%)	200 (100.0%)

From Table 23, only 9.0% of respondents who were aware of government structures promoting EVM said, they think the measures taken by the government are effective. However, 12.5% of them even though admitted their awareness of government structures denied the fact that government measures are effective.

On the part of Non-Governmental Organizations, pastoralists confirmed their awareness and gave examples

of two giant international NGOs that have worked with the grass root population in the past few years. These projects are; « *Cercle International pour la Promotion de la Creation* » (CIPCRE) which intervened in the West region and Heifer International Cameroon (HPI) which had its interventions in the North West and other parts of the country. The following cross table presents the viewpoints of pastoralists regarding these projects.

Table 8: NGOs' support for ethno-veterinary practices in the study area

If yes, what is the name of the NGO?		CIPCRE	HPI	Total
Are you aware of any NGO involved in promoting EVM and practices in your area?	YES	42 (21.0%)	27 (13.5%)	69 (34.5%)
	TOTAL	42 (21.0%)	27 (13.5%)	69 (34.5%)

From Table 24, over 21.0% of respondents who admitted their awareness of an NGO recognized CIPCRE (*Cercle International pour la Promotion de la Creation*) as the main organization that has promoted and supported ethno-veterinary practices in their area. A similar story is seen with the rest of the respondents (13.5%) who were aware and familiar with the Heifer International Project (HPI).

2.5.3 Pastoralists' perceptions on the most workable solution in the conservation

and promotion of ethno-veterinary practices

Ethno-veterinary medicines form a capital resource pool for the pastoralists in the study area. According to them, this form of medicines is at the center of their livelihood activities. As earlier seen, they use it to treat their animals, their own health, gain financial benefits and even gain reputation. Despite other inconveniences, ethno-veterinary medicine stands a backbone of animal treatment by the Fulani pastoralists.

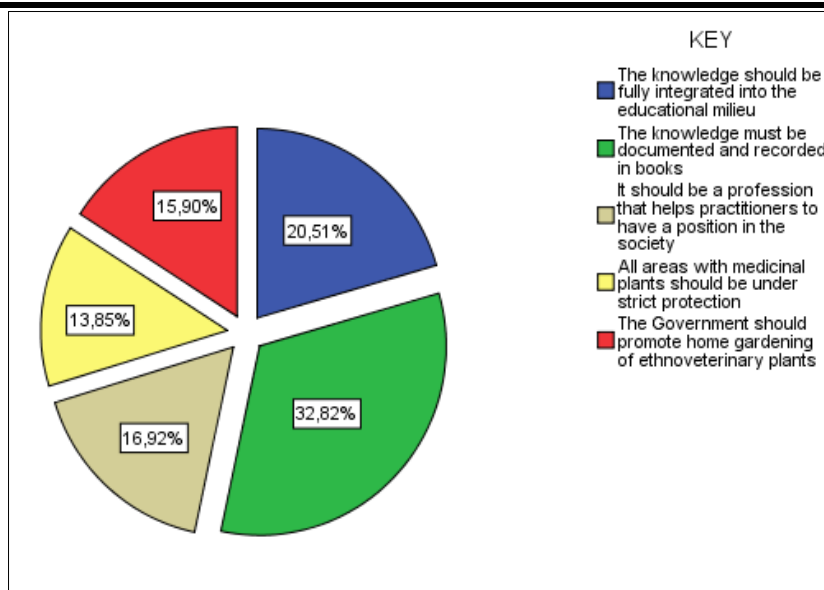


Fig.3: Pastoralists perceptions on the most workable solutions for ethno-veterinary practices

From Figure 12, majority of respondents (32.82%) proposed that ethno-veterinary knowledge and practices should be documented and recorded in books. Apart from documentation, other respondents (20.15%) said stakeholders’ needs to fully integrate the knowledge into schools and other professional milieu. They said nothing can be fully promoted if it is not taught in schools as a subject with a complete curriculum.

IV. CONCLUSION

The study was conducted in the Menoua division of the West region, with the purpose of assessing and documenting ethno-veterinary knowledge and practices amongst the pastoralists. This was achieved by assessing and analyzing more specifically; pastoralists’ perceptions regarding ethno-veterinary practices, major ethno-veterinary practices in the study area, major challenges faced by pastoralists in the field of ethno-veterinary, and pastoralists’ conservation measures for proper management of these knowledge/practices. The methods of study included the use of structured and semi-structured survey questionnaires from 200 sampled pastoralists, focus group discussion and field observations. The study covered 2 sub divisions based on the cattle population and disease prevalence. The 2 sub divisions were Koungh-ni and Fokoue.

Based on the findings of this study the active age for pastoralism falls within 20 – 59 years. Majority of the respondents were married with average household sizes varying between 1 and 20 persons. However, most of the respondents were unlettered with no formal education.

Their main livelihood activity proved to be both cattle rearing and crop cultivation. The study demonstrates very sufficiently that, pastoralists in the study area had a positive attitude and concern for ethno-veterinary medicines. A great majority (93.0%) confirmed disease prevalence in their area and over 62.0% of the respondents highlighted that, they use ethno-veterinary medicines together with conventional medicines to treat their animals. The majority of respondents together with focus group members further confirmed that ethno-veterinary medicines are ‘very effective’ if properly used. Therefore pastoralists did not only have a positive perception towards this system of medicine but also knew its value in disease management within the livestock sector. Ethno-veterinary practices were applied by the pastoralists for major cattle diseases plaguing their area such as; Brucellosis (*Bakkaale*), FMD (*Mboru*), Worms (*Bole*), Cowdriosis (*Nghabbu*), Streptothricosis (*Ngunya*), Babesiosis (*Sammore*), Diarrhoea (*Saaryl*), Ring worm (*Saanikoje*), Infertility (*Tablingo/Rimaare*), Ephemeral fever (*Dasi/Pappooje*), Bloat (*Guttel*), Wound (*Nawnaare*), Poisoning (*Tooke*), Fracture (*Yebre*), Lumpy skin (*Bollo*), Lice (*Tend’di*), Ticks (*Kooti/Duche*), and Flies (*Bokkaaje*).

Furthermore, pastoralists in the study area had serious challenges in the development and promotion of this system of medicine. First and foremost is that the medicinal plants used in treatment are not readily available. Another challenging area for the pastoralists is the difficulties in preparation and usage of ethno-veterinary medicines. Again, storage and preservation of ethno-medicinal plants is another serious problem in the

study area which causes the local people not to utilize this very important resource pool within their full potential.

Nevertheless, pastoralists in the study area have devised several conservation measures for this system of medicines, despite their limited resources and limited external support. They share this very important pool of knowledge with the younger generation which they believe is the most efficient method for the sustainability of ethno-veterinary practices/knowledge. They also preserve the medicinal plants used for ethno-veterinary purposes in home gardens to prevent their extinction and facilitate treatment.

Government and NGOs' support for ethno-veterinary practices, proved to be limiting in the study area most especially on the part of the Government. However the main government and NGO supporting platforms are the Divisional Delegation of MINEPIA and CIPCRE/HPI respectively. Notwithstanding, pastoralists proposed several measures they thought, should be done by stakeholders to improve and promote ethno-veterinary medicines. They include but are not limited to; Documentation of ethno-veterinary knowledge/practices, full integration of this system of medicine into the educational milieu, protection of areas containing ethno-medicinal plants, and the promotion of home gardening of medicinal plants.

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