Use of ethno-medicinal plants in small ruminants' diseases control in Kabba/Bunu, Kogi State, Nigeria

*Olobatoke R.Y., Olorunfemi, S.T. and Ekenta, C.M.

College of Agriculture, Division of Agricultural Colleges,
Ahmadu Bello University, Kabba, Nigeria.
yemisirose205@yahoo.com *+2348107032705*
*Corresponding author

Abstract

This study was conducted to assess the use of alternative medicine for the control of small ruminant diseases among livestock farmers in Kogi State. Data were randomly collected from 120 farmers in the areas of study, through well-structured questionnaires and where necessary oral interview. The data were analyzed using descriptive statistics and logistic regression. Results revealed that the modal age of the farmers was 51-60 years, while the mean age was 52 years. On the average, about 82% of the farmers attended formal education and they produce small ruminant animals on a small scale. Age ($r = 0.016$, $p = 0.03$), level of education ($r = -0.042$, $p = 0.04$), scale of production ($r = -0.005$, $p = 0.05$) and size of flock (-0.023, $p = 0.04$) were significant in determining the use of traditional medicine at 5% level of probability. Furthermore, the use of local methods of managing and preventing small ruminants' diseases may be effective and reliable based on the farmers' perception ($\bar{x} = 1.69$). More investigations need to be carried out on the local treatment practices reported in this study, in order to scientifically validate their efficacy for the purpose of integrating them into standard ethnoveterinary practices.

Keywords: Alternative medicine; diseases; goat; sheep; veterinary services; veterinary medicine

Introduction

Small ruminants constitute the greater percentage of ruminant production in the rural tropics owing to the fact that they are easier to manage and yield quick return on investment (Umunna *et al*., 2014). They require minimum capital investment compared with the large ruminants, and yet come in handy as an additional or emergency source of income to the rural poor who mostly raise the animals on free range. Furthermore, the small ruminants serve as a good source of animal protein and are therefore very helpful in alleviating malnutrition among the rural populace (Odo *et al*., 2000; Aruwayo *et al*., 2015). In Nigeria, small ruminant population was estimated to be 52 million goats and 33 million sheep based on 2016 livestock census, and represented about one-third of the country's agricultural gross domestic product (Adebowale, 2012). The enterprise has however, not been able to attain its peak due to several factors that negatively affect production. Some of these constraints include poor husbandry practices that predispose to theft and predation, poor feed quality and quantity, environmental factors and diseases such as mange, pneumonia, helminthiasis and peste-de-petit ruminante among others (Kusiluka and Kambarage, 1996; Ugwu, 2007). Disease is very important and often increases the cost of production, reduce quality/quantity of products and causes general losses to the farmer. Over the years, modern veterinary medicine has been the mainstay of livestock production in terms of disease control and prevention (Moreno and Lanusse, 2017). The veterinary services are however usually out of the reach of the rural poor either due to high service cost or unavailability of professional service providers (Matekaire and Bwakura, 2004). For these reasons, small ruminant farmers often resolve to using indigenous methods of treating diseases in their stocks,

among which is the use of herbs (Maroyi, 2012). The use of traditional medicine for treatment of livestock diseases in Nigeria however predates the advent of orthodox veterinary medicine. This is due to the fact that ruminant production has largely been in the hands of Fulani pastoralists who usually engage traditional medical practices to treat their sick animals (Nwude *et al*., 1980). Although the pastoralists are often knowledgeable and experienced in the traditional practice, the information are usually not documented but orally passed from one generation to another (Mesfin *et al*., 2009). Furthermore, in contrast to conventional veterinary practice, the traditional medicine is constrained by inadequate disease diagnosis, inability to treat viral diseases, lack of standard/exact dosage (which may lead to underdosing or toxicity due to overdosing), and unstandardized preparation/application methods (Wazala *et al*., 2005). In spite of these limitations, the use of alternative medicine in the maintenance of livestock health among rural farmers has continued to thrive and its efficacy has been proven by various researches (Mlambo *et al*., 2011). Factors such as ease of availability, low cost, ease of preparation/administration, and no special skill required, may have fostered the preference of rural farmers for traditional medicine (Uwagie-Ero *et al*., 2017). In Nigeria, numerous plants including scent leaf (*Ocimum gratissimum*), bitter leaf (*Vernonia amygdalina*), linseed (*Linum usitatissimum*), neem (*Azadirachta indica*) and guava (*Psidum guajava*) have been reported to be effective in treating wounds, helminthiasis, bloat, trypanosomiasis/helminthiasis and diarrhea respectively (Nok *et al*., 1993; Chah *et al*., 2009; Marandure, 2016). Small ruminant production plays a significant role in the economy and nutrition of rural populace in Nigeria. As a result, any effort made at improving small ruminant farming and health will go a long way in enhancing the production efficiency of rural producers and thereby improving their livelihood. Such efforts cannot be over emphasized, particularly in the face of the on-going economic crisis and rapidly growing population of the country. The current study is aimed at generating information on the use of traditional medicine in the control of diseases of small ruminants in Kabba/Bunu Area of Kogi State, Nigeria.

Materials and methods
Study area
The study was carried out in Kabba/Bunu area of Kogi State. The area lies within 7°49′43″N 6°04′23″E, with total land area of 2,706 km^2 and a population of 145,446 people. The average annual temperature and rainfall are 24.8ºC and 1242 mm respectively. The communities are mainly agrarian, and as such, both crop and livestock agriculture play dominant roles in the economy of the people (Dimelu *et al*., 2017).
Data collection and analysis
In the sampling procedure, purposive sampling technique was used to select those villages (n = 15) with high number of small ruminant farmers (Table 1) whereas random technique was used to select individual respondents (n = 125) within the selected villages. Data was collected through the use of well-structured questionnaires and where deemed necessary, oral interview techniques were conducted. Data on socio-economic characteristics were summarized using descriptive statistics (percentages and means), whereas logistic regression was used to analyze the determinants of the use of alternative medicine among farmers (Kretchy *et al*., 2014). Prevalent diseases of small ruminants were measured on a 2-point scale of "yes" scored as 1 and "no" scored as 0 (Tijani, 2019). The percentage of each disease identified was used to determine their importance to the respondents. Weighted mean and standard deviation were used to

measure the farmers' perceptions on the effectiveness of treatment options based on standard procedures (Amadi and Ekezie, 2016). A mean cut-off point of 1.50 and above was considered as agree, whereas a mean of less than 1.50 was considered as disagree (Bagheri, 2010).

Table 1.1 Distribution of questionnaires in the study area

Village	No of questionnaires distributed	No of questionnaires retrieved
Kabba axis		
Kabba town	20	20
Otu-Egunbe	10	10
Ogbagba	5	5
Okedayo	7	7
Ayedun	8	8
Kakun	5	5
Gbeleko	7	7
Ayedayo	5	5
Egbeda	10	10
Bunu axis		
Ayede	10	10
Edumo	5	0
Olle	10	10
Iluke	10	10
Okebukun	5	5
Aiyegunle Igun	8	8
TOTAL	125	120

Results and Discussion

The socio-economic characteristics of small ruminant farmers in the study area are shown in Table 2. In Kabba area, majority of the farmers are females (84.4%) and married (54.5%) with mean age of 52 years whereas in Bunu area, 86% of the farmers are females, married (55.8%) with mean age of 51 years. This shows that small ruminant farming in the study area is mainly in the hands of middle-aged women, an indication that women are making significant contribution to the farming system. It is not surprising that majority of the farmers are married because the income from small ruminant production may help a great deal in catering for family needs. This result agrees with the observations of Ramesh and Meena (2012) and Osho and Fasina (2013) in various ecological zones of India and Southwest Nigeria respectively, that women are more involved in small ruminant farming. Familade *et al*. (2011) and Omotara and Olutegbe (2015) similarly reported higher percentage of females among small ruminant farmers in Osun State. Dossa *et al*. (2008) noted that ownership of goats among the rural populace of southern Benin was higher for women who are mostly young. Contrariwise, Adams and Ohene-Yankyera (2014) and Yusuf *et al*. (2018) in separate studies observed that majority of small ruminant farmers in Northern Ghana and Northern Nigeria were males, although the females and adult children contributed meaningfully to the management of the animals. Furthermore, 87.1% of the farmers in Kabba area acquired formal education ranging from primary (27.3%) to tertiary (14.3%) levels whereas in Bunu area, 86.1% had formal education ranging from primary (27.9%) to tertiary (14%) levels although respondents with secondary school education were more in both areas (45.5% and 44.2% respectively). This shows that small ruminant farmers in the study area are literates and are therefore likely to embrace new management practices and innovations that will enhance their productivity. This is very important for proper adoption of new production

technologies. The level of literacy observed among the farmers in the current study is in accordance with the reports of Amimo *et al.* (2011) and Ummuna *et al.* (2014) who similarly observed high literacy among cattle farmers in Kenya and small ruminant farmers in the urban area of southern guinea Savannah region of Nigeria respectively.

Table 2: Socio-economic characteristics of small ruminant farmers in the study area

Variable	Kabba area			Bunu area		
	Freq	% (n = 77)	$\bar{x}$	Freq	% (n = 43)	$\bar{x}$
Age						
30 - 40	15	19.5		9	20.9	
41 - 50	11	14.3	52	6	14.0	51
51 - 60	32	41.6		18	41.9	
>60	19	24.7		10	23.3	
Sex						
Male	12	15.6		6	14.0	
Female	65	84.4		37	86.0	
Level of education						
Tertiary	11	14.3		6	14.0	
Secondary	35	45.5		19	44.2	
Primary	21	27.3		12	27.9	
No formal education	10	13.0		6	14.0	
Household size						
1 - 5	52	67.5		29	67.4	
6 - 10	22	28.6	5	13	30.2	5
>10	3	3.9		1	2.3	
Marital status						
Married	42	54.5		24	55.8	
Single	35	45.5		19	44.2	
Years of experience in ruminant production						
1 - 10	33	42.9		19	44.2	
11 - 20	3	3.9	18	2	4.7	19
>20	40	51.9		23	53.5	
Production scale						
Large scale	0	0		0	0	
Small scale	77	100		43	100	
Herd size						
1 - 10	58	75.3		32	74.4	
11 - 20	16	20.8	9	9	20.9	9
>20	3	3.9		2	4.7	

Source: Field Survey, 2019

The mean family size of farmers in both Kabba and Bunu areas were 5 persons, which is lesser than 7 members reported by Oluwatayo and Oluwatayo (2012) and Osho and Fasina (2013) in

studies conducted in the Southwest of Nigeria. This perhaps is why all the respondents (100%) embarked on small scale or subsistence production, with mean herd size of nine (9) animals, particularly owing to the fact that labour in small ruminant production is usually supplied by women and children (Iyiola-Tunji and Issa, 2010). Larger herd size will require more labour, although it also has the potential of increasing the household per capita income thereby reducing poverty. The herd size noted in this study agrees with the observations of Iyiola-Tunji and Issa (2010), but contrary to the report of Rabiu *et al.* (2013) who conducted similar studies in northern Nigeria. Majority of the respondents in both Kabba and Bunu areas however, seemed to have been in the production business for long, as evidenced by the fact that 51.9 % and 53.5% of them respectively have more than twenty years of experience. This disagrees with the reports of Umunna *et al.* (2014) who conducted their study in the peri urban area of southern Nigeria and noted that majority of their respondents have 1 - 5 years of experience. The variation in responses could be due to location of the farmers. The rural farmers may have been keeping small ruminants at low level yet, as part of their farming activities, which may include crop and other livestock species (Ajala, 2004). The peri-urban farmers on the other hand, may have taken up the business as a response to the protein demands of the growing urban population. The farmers in the study area are therefore mostly educated married women, who practice subsistence farming with many years of experience.

Table 3 shows small ruminants common diseases in the study area, and the alternative medicines used to treat them. Diarrhea ranks first on the list as all the respondents (100%) said they encountered the disease in their animals. Chah *et al.* (2009) similarly observed high prevalence of diarrhea in small ruminants in the Eastern part of Nigeria, and that the disease occurs most commonly during the wet season of the year. Although the incidence of diarrhea is also high (26%) in Osun State of Nigeria, it was second to pneumonia (30%) (Anaeto *et al.*, 2009).

Table 3: Small ruminant diseases and alternative medicines used in treating them in the study area

Diseases/Disorders	% (n=120)	Rank	Traditional medicine used
Diarrhea	100	1st	Millet grain, sea water, sorghum grain, scent leaf, guava leaf and cassava flakes
Scabies/mange	95	2nd	Shea butter and used engine oil
Helminthiasis	86	3rd	Pawpaw seeds
Pneumonia	82	4th	Pepper
Wounds	70	5th	Scent leaf, bitter leaf and Siam weed (*Chromolaena odorata* formerly called *Eupatorium odoratum*)
Retained placenta	51	6th	Jute (*Cochorus olitorius*) seed
Mastitis	25	7th	Banana fruit or unripe plantain
Ectoparasites	23	8th	Lime water and shea butter
Cough	3	9th	Cooked pap with Shea butter or palm oil
Foot rot	3	10th	Pepper

Source: Field survey, 2019

This observation is contrary to the reports of Abdullahi *et al.* (2013) who observed that mastitis (37%), and foot and mouth disease (35%) were more prevalent than diarrhea (15%) in small ruminants in Katsina State. Although diarrhea may be caused by various factors ranging from digestive disorders to poisoning, it is also a symptom of different disease conditions such as peste-de-petit ruminante, colibacillosis and enteric salmonellosis (Kusiluka and Kambarage, 1996; Offiah *et al.*, 2011), which the rural farmers may not be able to identify. Other high ranking diseases in the current study, in consonance with previous researches, are mange (95%),

helminthiasis (86%) and pneumonia (82%) in order of importance (Omoike, 2006; Umunna *et al.*, 2014; Kardjadj, 2017). Diseases constitute a major constraint to livestock production, particularly in the rural areas where access to veterinary medicines and services may not be available or too expensive for the rural farmers to afford.

Furthermore, all the farmers used plants or non-drug substances (such as used oil and cassava flakes) to treat small ruminant diseases (Table 3). Jegede *et al.* (2007) similarly noted in their studies that most farmers in rural communities in Enugu engage traditional methods to treat diseased animals. Majority of the farmers use cereals, scent and guava leaves and cassava flakes (garri) to treat diarrhea in their stocks. The use of cassava, sorghum and millet to treat diarrhea concurs with the observation of Chah *et al.* (2009), although the respondents in the study which they conducted in the Eastern part of Nigeria, used maize in place of sorghum/millet. Lans and Brown (1998) similarly reported the treatment of diarrhea with guava leaves among ruminant farmers in Trinidad and Tobago. This implies that the substances used to treat diarrhea by farmers in the current study are not new, but have been explored for the same purpose in some other places. Indeed, the use of traditional medicines for treatment of diarrhea has become a common practice in recent times (Devi *et al.*, 2013). This is an indication that the substances may be effective in controlling diarrhea, although there is no standard dosage or method of preparation. The treatment of mange using engine oil in the current study, accords with the reports of Chah *et al.* (2009) and Adedeji (2012). Similarly, Omotara and Olutegbe (2015) noted that small ruminant farmers in Obokun Local Government Area of Osun State used shea butter mixed with salt to treat mange, ground pawpaw (*Carica papaya*) seeds with lime orange for the treatment of helminthiasis, and tobacco snuff with pepper for pneumonia. Most of the herbs and non-drug substances used by farmers in the current study area are in consonance with findings of previous researches. For instance, small ruminant farmers in Ikenne Local Government Area of Osun State also used pawpaw seeds for the treatment of helminthiasis, and scent leaf for delayed parturition and poor milking in their stocks (Anaeto *et al.*, 2009). Bitter leaf, used for wounds in the current study, was used to treat worms in Zimbabwe whereas pepper was used for the treatment of diarrhea (Maroyi, 2012). The farmers probably use traditional medicine based on ease of availability and low cost in the study area.

Jegede *et al.* (2013), in stating some of the advantages of ethno-veterinary medicine, affirmed that they are cheaper than comparable orthodox drugs, locally available, easily accessible and culturally appropriate. Furthermore, the medicinal potentials of most of the herbs used by farmers in this study have been reported in various researches (Hoste *et al.*, 2002; Costa *et al.*, 2006). They are thought to contain active ingredients that are able to work harmoniously within the host body without causing undesirable side effects (Zeineldin *et al.*, 2018). Some of the shortcomings of ethno-veterinary medicine however include seasonal availability of some herbs, ineffectiveness of treatments in some cases, potential for toxicity induction in treated animals (particularly due to lack of standard dosage) and harmful methods of administration (Martin *et al.*, 2001; Githiori *et al.*, 2005). In general, ten (10) diseases were identified as prevalent in the study area, with diarrhea, mange and helminthosis ranking topmost in order of importance. In addition, the farmers in the study area use herbs and non-drug substances such as cassava flakes, shea butter, scent leaf and guava leaf to treat various diseases.

Table 4 shows the relationship between socio-economic characteristics of farmers and the use of alternative medicine in small ruminant production. Age ($r = 0.016$), level of education ($r = -0.042$), scale of production ($r = -0.005$) and size of flock ($r = -0.022$) were significant in determining the use of traditional medicine at 5% level of probability. The relationships of some

of the socio-economic characteristics were negative, implying that an increase in a unit of the socio-economic characteristics will result to equal proportional decrease in the use of traditional medicine.

Table 4: Socio-economic determinants of the use of alternative medicine among small ruminant farmers in the study area

Characteristics	Coefficients	Standard Error	t Stat	P-value
(Constant)	1.3513	0.3567	3.7883	
Age	0.0159	0.0055	2.8909	0.0313**
Sex	0.0950	0.0511	1.8590	0.0658
Level of education	-0.0418	0.0181	-2.3094	0.0440**
Household size	0.1739	0.1000	1.7393	0.0847
Marital status	0.1653	0.1304	1.2674	0.2076
Years of farming experience	0.0048	0.0048	1.0090	0.3151
Scale of production	-0.0047	0.0023	-2.0434	0.0481**
Size of herd	-0.0215	0.0075	-2.8666	0.0398**
Log likelihood	112.50*			
Cox and Snell R square	0.52			

** = Significant ≤ 0.05

Therefore, increases in level of education, scale of production and size of herd will lead to a decrease in the use of traditional medicine. On the other hand, age was positively significant at 5% level of probability, implying that as the farmers increase in age, their tendency to use traditional medicine also increases. Older farmers are therefore likely to use traditional medicine than younger ones, probably because they may be more knowledgeable and experienced in the use of traditional medicine. These results are in accordance with the observations of Mafimisebi *et al.* (2012), who also noted negative and positive relationships of herd size and farmer's age respectively with the use of traditional medicine among farmers in Southwest Nigeria. In contrary, Omotara and Olutegbe (2015) observed that there was no significant relationship between age, sex, educational level and level of use of endogenous knowledge in treating livestock diseases in Obokun area of Osun State. The adjusted R square of 0.52 in the current result implies that 52% of the variations in the use of traditional medicine in livestock production were influenced by the socio-economic characteristics of the farmers. Therefore, socio-economic factors such as age, level of literacy and herd size play significant roles in the use of alternative medicines by the farmers in the study area.

The farmer's perception on the effectiveness of traditional medicine is shown in Table 5. With the mean cut-off point of 1.50, the result shows that the farmers considered traditional medicine to be an effective method ($\bar{x}$= 1.69) of treating small ruminant diseases compared with veterinary services/drugs ($\bar{x}$ = 0.53). This may actually be due to significant constraints associated with the use of veterinary services/drugs ($\bar{x}$ = 1.53) compared with traditional medicine ($\bar{x}$ = 0.33). It was observed that the farmers may prefer use of alternative medicine in small ruminant production compared to veterinary drugs/services that are oftentimes not available, and are usually expensive even when accessible. The same factor could also be responsible for ineffectiveness of the combination of veterinary services with traditional medicine ($\bar{x}$ = 0.48). These results possibly indicated that traditional medicines used for the treatment of small ruminant diseases in

the study area, are effective and preferred by the farmers compared to the modern veterinary medicine.

Table 5: Farmers perceptions on the effectiveness of alternative medicines used in the study area

Variables	Mean	SD
Effectiveness of traditional medicine	1.69*	0.46
Effectiveness of veterinary service	0.53	0.49
Constraint of traditional medicine	0.33	0.47
Combination of traditional medicine with veterinary service	0.48	0.50
Effectiveness of the combination	0.21	0.40
Constraint of veterinary service	1.53*	0.47

Source: Field survey, 2019; Cut-off ≥ 1.5

These observations accord the reports of previous researches (Abdullahi *et al*., 2013; Omotara and Olutegbe, 2015; Zeineldin *et al*., 2018). In the reports of Sanhokwe *et al*. (2016), who assessed the medicinal plants used by farmers to control goat parasites in Eastern Cape Province of South Africa, the farmers mentioned efficacy of the local herbs, low cost and ease of accessibility as reasons for their preference for traditional medicine. Moreki *et al*. (2010) similarly attributed the wide use of ethnoveterinary medicine in villages to high cost of commercial veterinary drugs in most rural areas. Therefore the perception of farmers in the current study area is that alternative medicines are more effective than orthodox veterinary drugs in the treatment of small ruminant diseases that are prevalent in the area.

Conclusion
The study revealed that majority of small ruminant farmers in the study area are middle-aged, educated married women, who practice subsistence farming with many years of experience. Prevalent small ruminant diseases identified include diarrhea, mange, helminthosis, pneumonia, foot rot, retained placenta and wounds. The farmers however, use different herbs (such as scent leaf, *Chromolaena odorata*, guava leaf, and bitter leaf) and non-drug substances (such as millet, salt, shea butter and used engine oil) to treat the various animal diseases, with the belief that they are effective. The farmers believed that use of herbs as local treatments of small ruminants diseases may be more convenient than conventional veterinary services because of efficiency, low cost and ease of accessibility. However, socio-economic factors such as farmer's age, literacy and herd size were significant determinants of the use of alternative medicine in the study area. More investigations need to be carried out on the local treatment practices reported in this study, in order to scientifically validate their efficacy for the purpose of integrating them into standard ethnoveterinary practices. Modern veterinary services should also be made available to the rural farmers at affordable costs.

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