NSUK Journal of Science & Technology, Vol. 6: No. 2. 2016. pp. 20 -24 ISSN: 1597- 5527

PREVALENCE OF HEAMOPARASITES (*BABESIA SPECIES*) IN SHEEP UNDER THE TRADITIONAL SYSTEM OF MANAGEMENT IN LAFIA METROPOLIS NASARAWA STATE, NIGERIA

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ABSTRACT
A study of the prevalence of Babesiosis in fifty sheep was conducted in Lafia metropolis within four (4) wards of Lafia, LGA (Shabu/Kwandere, Makama, Gayam and Chiroma wards, respectively) from February to May, 2013., to reveal the prevalence of Babesiosis in Sheep. The fifty sheep sampled were across different breeds, sexes and ages, amongst which were Yankasa, West African Dwarf and Balami. Two milllilitres of blood samples were collected from each sheep and analyzed using thin and thick smears - Giemsa stain. The stained slide preparations were microscopically viewed under x 40 objective. The results revealed that most *Babesia* species occur with varied prevalence. The study confirmed the prevalence of infections due to parasites (*Babesia)* and tick infestation in Lafia Metropolis. It also revealed that *B. ovis* were exerting more burden on the animals compared to *B. motasi*. The different breeds of sheep sampled showed that West African Dwarf sheep were more resistant to *Babesia* species. The percentages of infection rate of parasites were, 6.98% and 71.43% of *B. motasi*. The PCV mean values among the four (4) wards varied at 23.56, 21.4, 23.67 and 23.30, respectively.
Keywords: Yankasa, West African Dwarf sheep, Balami, Babesiosis, *Babesia* species.

INTRODUCTION
Haemoparasites, also known as blood parasites are intracellular or intercellular microorganisms inhabiting the red blood cells of animals. They rely on the vector or carrier to transmit the m to the host (Bhatia *et al* 2010). Haemoparasites generally cause destruction of red blood cells resulting in anaemia, jaundice, anorexia, weight loss and infertility. Common genera of haemoparasites of livestock include those in the Genus *Trypanosoma*, *Babesia*, *Anaplasma*, *Theileria* and the *juvenile* of *Filarid* worms (Khan *et al.,* 2005). The Nigerian Cattle population was reported to be about 150 million according to 2007 projection apart from Sheep and Goats, pigs, dogs, cats, rabbits and guinea pigs (FLD&PCS, 2007). In monetary terms, the value of losses of Nigeria livestock population due to diseases and mixed agriculture resources was conservatively estimated to be in the order of 5 million U.S Dollars (Mulumba,2003). The role of livestock in Nigerian's rural economy makes significant contribution to the sustenance and growth of the overall economy. Indeed a reasonable number of the rural population is engaged in livestock rearing which helps them to derive their annual income. Tick born disease infestation in ruminants is one of the major constraints to the livestock industry in developing countries which adversely affects the animals as a vector of Babesiosis and as a serious constraint to economic performance, mainly by transmission of serious disease pathogens of animals. Haemoparasites are found in the blood of mammals (small ruminants). Such parasites include *Anaplasma*, *Babesia*, *Cowdria theilaria, Eperythrozoon*, and *Trypanosoma* species. Their effects on the susceptible hosts vary from reduced productivity to death (Urquhart *et al*. 1988). Babesiosis is transmitted by *Ixodid* ticks, caused by intra-erythrocytic protozoan parasite, *Babesia ovis* and *Babesia motasi* (Family: Babesiidae) infects a wide range of domestic animals and causes progressive haemolytic anaemia. A marked rise in body temperature, reaching 40–41°C, loss of appetite, cessation of rumination, laboured breathing, haemoglobin-uria, weakness and a reluctance to move are some of the symptoms developed especially in more protracted cases. The fever during /infections may cause pregnant ruminants to abort fetus and males show reduced fertility.

Several parasitological diagnostic methods are available for the detection of blood parasites. These include methods such as wet film, thin and thick smears and sero-immunological diagnosis. (Ilemobade, 1971; Graczyk, 2003). The diagnosis of ruminant piroplasmosis is generally based upon the microscopic examination of Giemsa stained blood smears and by clinical symptoms in acute cases. After acute infections, recovered animals frequently sustain sub-clinical infections, which are microscopically undetectable. They can be considered as a source of infection for the potential vector causing natural transmission of the disease (Babesiosis). Serological methods are frequently employed in determining sub-clinical infections. However, serology for detecting carrier state lacks specification and sensitivity, especially for infection status. Therefore, DNA amplification methods, which are more sensitive and specific than other conventional methods may facilitate and can be used as a powerful tool for the diagnosis of Babesiosis. In this study, attempt is made to investigate and provide relevant information regarding the prevalence of haemoparasites (*Babesia)* of small ruminants in Lafia Metropolitan area of Nasarawa State, Nigeria.

Parasitic diseases have egregious impact on human and animal health worldwide particularly in developing countries. *Babesia*, *Trypanosoma* and *Leshmania* continue to result in large number of deaths each year, while drug resistance in *Trypanosomosis* is increasing as a public health problem (Ellis *et al.,* 2003). In agriculture, the steadfast presence of parasites in livestock industries throughout the universe is responsible for significant economic loss, while control measures against parasitic infection alone cost over one billion pounds annually (Mc Donald, 2003).

West African Dwarf (WAD) sheep are small ruminants which are ubiquitous in villages throughout the Nigerian rain forest and the derived savannah (ILCA, 1987). These

animals have great economic potential because of their high fertility and early maturity as well as their adaptability to humid environment (Ademosun, 1988). However, the benefits derived from these animals are far below expectation mainly due to disease and resulting in low productivity. This is also due to numerous factors; the major one being disease (Akerejola *et al.*, 1979). For example mortality rates of 34.12% and 36.20% have been reported respectively for sheep and goats in the old Bendel State (ILCA, 1987). Most apparent are disease caused by blood parasites.

In Nigeria, also in Lafia Metropolitan Area of Nasarawa State, prevalence of Haemoparasites is faced with tremendous disease constraint apart from its cost of treatment and control. The economic loss in livestock industry produce by various *Babesia species* is high as it lowers productivity and constitutes a serious draw-back to the growth and development of livestock industry.

Justification of the study

The adverse effects of parasites over decades have been the major constraint to the livestock industry in Nigeria. Haemoparasites in small ruminants are responsible for significant economic losses as loss of body weight lower productivity and even resulting to death of animals. More so there may little or no studies on the prevalence of *Babesiosis* of small ruminants under the traditional system reared in Lafia Metropolis, hence the need for the conduct of research of the prevalence and the effects in this area

The objectives of this research work sought to determine the prevalence and effect of *Babesia Species* of sheep kept under traditional system in Lafia Metropolis and to recommend measures for effective control of the disease parasite.

MATERIALS AND METHODS

Study area

Lafia is a capital city of Nasarawa State in the North central Nigeria. Lafia is situated within the guinea savanna of the ecological zone of Nigeria, the state lies between latitutes 7º50` and 9º50'N and longitute 6º54E. It is characterised by a tropical sub-humid climate with two distinct seasons; the wet season from about April to October , and the dry season between November and March.

Annual rainfall range from 1100mm to about2000mm. Temperatures are generally high during the day, particularly between the month of March and April. Mean monthly temperatures are between 28^{oC} and 38^{oC} (Lyam, 2001). It is 100km^2 north of Benue River and South-East of Abuja. Lafia is bounded by Obi Local Government Area in the South, Doma Local Government Area in the West, Nasarawa Eggon Local Government Area in the North and Quan-pan Local Government Area of Plateau State in the East. The Local Government Area has a total land mass of about 27,373km^2..It has a human population estimated to be about 13,419 according to 2006 population census by National Population Commission (NPC). The major occupations of the city dwellers are farming, rearing of animals and trading. Lafia is well known for its Agricultural activities mainly the production of yam, rice, cassava and rearing of animals. The study location include: Danka Sarki, Shinge (cattle market), Bukan Sidi and Workers Village. The study was carried out between the months of February and May, 2013.

Site selection

The selection of site was done on the basis of availability of livestock in the area (Sheep) and in each location, the Sheep were randomly selected. Sheep in the study location were all of indigenous breeds. They were managed by the extensive system of management. Blood samples were collected from the jugular veins of each sheep with a sterile hypodermic syringe and needle. About 3ml of blood was collected from each animal into bottles containing about 2 drops of 10% disodium ethylene diamine tetra-acetic acid (Na_2EDTA) as the anticoagulant (Taylor-Crosland, 1982). The bottles were gently tilted to ensure proper mixing of blood sample and the anticoagulant. The bottles were then labeled accordingly and kept in a cooler containing ice blocks and transported to the National Veterinary Research Institute, Vom (Parasitology Laboratory) for analysis.

Data collection

A total of 50 Sheep were sampled from various locations, 16 from Lafia Abattoir, 13 from Workers Village, 12 from Bukan Sidi and 9 Danka Sarki respectively, all across the entire Lafia Metropolis.

Determination of Parasitaemia

The stained slide preparations were microscopically viewed under x 40 objective. The observed parasites were identified according to the methods described by Levine (1985), Brown (1990) and Kreier (1994). The grading of parasitaemia was determined by estimating the number of parasites per blood ml. The parasitaemia for infections with *Babesia* and other haemoparasites were arbitrarily assessed considering the mean number of cells infected per microscopic film viewed.

Data analysis

The data obtained from this study was analyzed using Analysis of variance (ANOVA) and descriptive statistics which involves the use of simple percentages.

RESULT

The results from this study are presented in Table 1-3 below. Table 1 shows the percentage parasite load in breeds of sheep and the prevalence of Babesiosis as a disease in Lafia metropolis amongst different breeds of sheep. There were no marginal differences in the levels of infection rate by the different species of the Babesia (*B. motasi*) parasites especially between the Yankasa and West African Dwarf Sheep. Balami were more susceptible than other breeds (71.43%) studied while the West African Dwarf sheep were not infected by the haemoparasites (*Babesia* spp.).*The B. motasi* were less prevalence as compared to the *B. ovis.* Table 2 is an indication of haematological parameters in percentages which ranked very closely and without much significant difference to the standards in Table 3. Table 3 is an indication and picture of general ranges of normal blood values in sheep.

Table 1: Prevalence 0f Haemoparastes (Babesia spp) in some breeds of sheep in Lafia Metropolis

Breeds of sheep	No. Examined	*Babesia* Species	No. Infected	% Infected
Yankasa	32	*B. motasi*	2	6.25
West African Dwarf	11	*B. Motasi*	1	9.09
Balami	7	*B. Ovis*	5	71.43
Total	50		8	

Table 2: Percentages of haematological Parameters of breeds of sheep from the different locations in Lafia Metropolis

Location	PCV (%)	RBCx10^{12}/L	WBCx10^{9}/L	Hbg/dl	N	L	M	E	B
Danka Sarki	23.56	4.16	7.09	9.39	63.25	35.88	56.25	0	31.25
Lafia Abattoir	21.4	4.74	8.17	9.69	68.78	30.89	33.33	0	0
Bukan Sidi	23.67	4.18	7.15	9.23	66.17	33.25	41.67	16.67	0
Workers Village	23.30	4.27	7.34	9.25	66.08	32.69	15.38	0	0

Table 3: Normal blood values of some small ruminants (sheep and goat).

Parameters	PCV)	RBCx10^{12}/l	WBCx10^{9}/l	Hbg/dl	N	L	M	E	B
Sheep	26-46	8-16	4-12	9-12	0-0.3	2-9	0-0.8	0-0.7	rare
Goat	22-38	8-18	4-13	8-12	0-0.12	2-9	0-0.55	0-6.5	rare

Adejinmi, J.O *et al.* (2004).

DISCUSSION

The detection of Babesia parasites in the current study confirms the existence of infections due to haemoparasites (*Babesia* spp.) and tick infestation as vectors of Babesia parasites.The increasing incidence of haemoparasites in the area could be attributed to concentration of livestock in the area, favourable climate and continues extensive system of management by owners. The study confirms the report of previous studies on the range of haemoparasites found in Nigeria (Agu *et al.*, 1990; Agu and Amadi, 2001; Enwezor *at al*., 2009; Kamani *at al.*, 2010). The percentages of parasites were, 6.98 and 71.43% of *B. ovis and B. motasi* respectively. The observed prevalence of *B. ovis and B. motasi* as one of the blood parasites indicated that animal Babesiosis still remains as one of the major parasitic blood diseases of sheep in the area. From the result of the study, the thin smear indicated that out of 50 samples 8 parasites were found. This further suggests a low resistance of sheep to *Babesia spp* and possibility of transmission of the parasite through cyclical means amongst the different breeds of sheep by tick vector. The sheep examined were apparently healthy, the red blood cells (RBC), white blood cells (WBC), pack cell volume (PCV), haemoglobin (Hb) concentration were determined as described by (Schalm *et al*., 1975). The red blood cells (RBC), white blood cells (WBC), haemoglobin (Hb), pack cell volume (PCV), neutrophils (N), lymphocyte (L), monocyte (M), Eosinophils (E), Neutrophils (N) and basophils (B) values obtained from the study in both breeds of sheep were about the same with those reported in goats by Sanor and Schil, (1977). The different breeds of sheep were found to be infected with *B. motasi* and *B. ovis* respectively as a result of the low values in PCV. The RBC reduced with increase in WBC, the Hb was at average level during the study. Some sheep were found with both *B. motasi* and *B. ovis* due to the invasion of the parasite, which affected their Hb level and increasing their WBC above the RBC which clearly showed signs of infection. The PCV value of some sheep in the study area were low which could be probably due to excessive stress as they roam about, inadequate feeding i.e. low level of nutrition which affected the Hb directly and thereby increasing the RBC value. According to the blood samples analyzed, certain blood parameters were slightly higher than the normal values whereas in some cases certain parameters were slightly below the normal values. And this is as a result of infection caused by the parasites, heavily infected sheep may experience low blood count especially, the PCV, Hb and RBC. With respect to WBC which is partially produced in the Lymph node and bone marrow (Lymphocyte and monocyte) the reduction or slight increase depends on the infection rate associated with the animal. Slight drop in WBC value may be as a result of low levels of nutrition or disease infection. While, the slight increase in WBC may be as a result of active immunity that enhanced the production of antibody. This agreed with similar research conducted at Jere on effect of blood sucking parasites in sheep and goats (Adejinmi *et al.*, 2004) the presence of blood parasites and their vectors constitute a permanent hazard to animal production in the study area. Therefore, a strategy directed at reducing and or complete destruction of the vectors and reservoir hosts of these parasites will need appropriate attention.

CONCLUSION

The overall result revealed that there was *B. motasi* and *B. ovis* infection in the different breeds of Sheep in the area and probably other haemoparasites which invaded sheep and adversely affected their performance and productivity in the study area. The slight differences in the comparative infection rates of the haemoparasites in the different breeds of sheep seems to indicate that these parasites may not be breed specific in their infections (Onyido and Iwuala, 1982). System of management and inadequate herd health programmes were the major constraints in the study area..

RECOMMENDATIONS

Various control strategies and plan to improve the production and health of sheep in Lafia Metropolis amongst which should be good husbandry practices, use of better management systems, improved control of haemoparasitic vectors and educate farmers on the need to keep their flock free from haemoparasitic diseases.

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