Occurrence of haemoparasites in cattle slaughtered at Jalingo abattoir, north-eastern Nigeria

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Abstract
Livestock plays a significant role in the economy of a nation but its productivity can be hampered by numerous haemoparasites thereby leading to economic losses to the livestock industry. The prevalence of haemoparasite in cattle slaughtered at Jalingo abattoir was investigated. A total of four hundred blood samples were collected at the point of slaughter, processed, and screened for haemoparasites by examining Giemsa-stained thin blood smears. An overall prevalence of 12.25% was recorded. Four haemoparasites of cattle with prevalence rates of 5.0%, 6.75%, 0.25%, and 0.25% for Anaplasma, Babesia, Microfilaria and Trypanosoma respectively were observed. The prevalence of haemoparasite in relation to sex, revealed higher infection in females (13.75%) than in males (10.0%) which were not found statistically different (P > 0.05). All breeds encountered during the study were infected with haemoparasites with the highest prevalence of 13.91 % recorded in White Fulani, Red Bororo (10.94%), and Sokoto Gudali (10.00 %), while Adamawa Gudali had the least prevalence of 0.5%. There was no statistically significant difference in the prevalence of haemoparasite in relation to breeds (P > 0.05). High prevalence was observed in the young (14.29%) more than the adult (11.59%) and older (12.14%). The current study has revealed the haemoparasites status in cattle slaughtered at Jalingo abattoir. Therefore, there is a need for effective preventive and control policy of these haemoparasites to enhance livestock productivity.

Keywords: Abattoir, cattle, haemoparasite, prevalence, slaughter

Introduction
Nigeria has about 10-15 million cattle, which accounts for one-third of agricultural gross domestic product (GDP), providing income, employment generation, food, draught power, hide and skin, farm...
manure, transport, and major source of government revenue (Oluwafemi et al., 2001; NLS, 2009). Cattle in Nigeria may be infected with a wide range of vector-borne haemoparasites transmitted by ticks and tsetse flies (Soulsby, 1982; FAO, 1984). The most economically important genera are Trypanosoma, Babesia, Anaplasma, Ehrlichia, and Theileria (Kamani et al., 2010). Their negative impact on health, productivity, reproduction, and performance of affected animals accounts for economic losses to livestock producers in the tropics and subtropics (Soulsby, 1982; FAO, 1984; Abdullah et al., 2019).

Parasitic diseases have debilitating effects on human and animal health worldwide, particularly in developing countries (Ellis et al., 2003). The direct losses caused by haemoparasites are connected to acute illness and death, premature slaughter and rejection of some body part at meat inspection, while indirect losses comprise of drop in production potentials, such as decreased growth rate, anemia, jaundice, infertility, anorexia, loss of weight in young growing animals and late maturity of reproducing and slaughter stock (Hansen & Perry, 1994; Ademola & Onyiche, 2013; Opara et al., 2016). In several studies carried out on haemoparasites of cattle in Nigeria Agu et al. (1990) and Enwezor et al. (2009) reported a prevalence of 9.4% and 13.5% both in Kaduna north-western part of Nigeria. In a similar study conducted in north-central Nigeria, Kamani et al. (2010) reported a prevalence rate of 25.7%. In cattle slaughtered from Gboko, Benue state, Zawua et al. (2015) reported a prevalence of 28.9% while Adua & Idahor (2017) in Lafiya reported a prevalence of 20.1%. In another study conducted in Ebonyi and Calabar states south-east and south-south parts of Nigeria, Agu & Amadi (2001) and Enogiomwan et al. (2019) reported prevalence of 3.9% and 7.78% respectively. 6.67% prevalence of haemoparasite in Nigeria, Agu & Amadi (2001) and Enogiomwan et al. (2019) reported prevalence of 3.9% and 7.78% respectively. In a study conducted in north-western part of Nigeria, Kamani et al. (2010) reported a prevalence rate of 25.7%. In cattle slaughtered from Gboko, Benue state, Zawua et al. (2015) reported a prevalence of 28.9% while Adua & Idahor (2017) in Lafiya reported a prevalence of 20.1%. Another study conducted in Ebonyi and Calabar states south-east and south-south parts of Nigeria, Agu & Amadi (2001) and Enogiomwan et al. (2019) reported prevalence of 3.9% and 7.78% respectively. 6.67% prevalence of haemoparasite in Nigeria, Agu & Amadi (2001) and Enogiomwan et al. (2019) reported prevalence of 3.9% and 7.78% respectively. 6.67% prevalence of haemoparasite in Nigeria, Agu & Amadi (2001) and Enogiomwan et al. (2019) reported prevalence of 3.9% and 7.78% respectively.

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Materials and Methods
Study area
The study was conducted in Jalingo, the capital city of Taraba State, north-eastern Nigeria. Jalingo is located between latitudes 8°47’ to 9°01’N and longitude 11°09’ to 11°30’E. To the north it is bounded by Lau Local Government Area and to the east by Yorro Local Government Area, to the south and west by Ardo Kola Local Government Area. It has an overall land area of about 195 km² with a population of 140,318, people according to the 2006 population census, with a projected growth rate of 3% (Shawulu et al., 2008). In 2014, the projected population was 165,774 (Oruonye, 2014). The study population consist of ruminant (cattle) slaughtered at the Jalingo abattoir. The abattoir has an average daily slaughter of 50-70 cattle (Oruonye, 2015).

Sample collection and processing
Blood samples were aseptically collected randomly at the point of slaughter from 400 ruminants (cattle) of both sexes, different breeds, and age groups. About 5ml of blood sample from the jugular vein of each animal was collected into a well-labeled ethylene diamine tetra acetic acid (EDTA) tubes indicating sex, breed, and age of animal. Samples were then transported immediately in cooled box to the National Veterinary Research Institute (NVRI), Jalingo zonal office laboratory for analysis. In the laboratory, thin blood smears were prepared using the method described by Ademola & Onyiche (2013). The smears were examined at ×100 magnification (oil immersion) on an Olympus microscope for the presence and identification of blood parasites according to keys and descriptions as given by Soulsby (1982) and Taylor et al. (2016). Buffy coat concentration method was used for the detection of trypanosomes in the blood (Cheesewbrough, 2005).

Statistical analysis
Analysis using simple descriptive statistics for all parameters was conducted. Statistical package for social sciences (SPSS) was employed in analyzing the data in the study. A P-value of < 0.05 was considered as significant.

Results
Haemoparasite distribution found in cattle slaughtered at Jalingo abattoir as presented in Table 1 indicate that out of the 400 cattle examined, 49 (12.25%) were infected with different haemoparasites. Four haemoparasites of cattle were identified in this study; Anaplasma, Babesia, Microfilaria and Trypanosoma (Table 1). Babesia spp was the most prevalent haemoparasite 27 (6.75%), followed by Anaplasma spp 20 (5.0%), while Microfilaria 1 (0.25%) and Trypanosoma spp 1 (0.25%) were the least prevalent recorded in the study (Table 1). Prevalence in relation to sex was
higher in the female 33 (13.75%) than in the male 16 (10.0%) (Table 2), even though there was no significant association $\chi^2 = 0.262, df = 1, p > 0.05$. Tables 3 and 4 show the prevalence of haemoparasite in relation to breeds and age. All breeds of cattle examined were infected with haemoparasites. The highest prevalence was observed in White Fulani 13.91% (37), followed by Red Bororo 10.94% (7), Sokoto Gudali 10% (2), and Adamawa Gudali 6% (6) in that order. Prevalence of haemoparasites in relation to breed had no significant association ($\chi^2 = 0.441, df = 3, p > 0.05$). Young cattle above 1-5 years of age recorded the highest prevalence 14.29% (8) followed by age group >10 years (older) with prevalence of 12.14% (25), while lowest prevalence of 11.59% (16) was recorded in adult animals of age group >6-10 years (Adult).

**Discussion**

The study has revealed the prevalence of haemoparasite in cattle slaughtered in Jalingo abattoir, north-eastern Nigeria. Haemoparasite exerts negatively on the health, reproduction, and performance of affected animals and this can be of major constraints to livestock productivity. The overall prevalence of 12.25% in this study is higher than earlier reports conducted on haemoparasites of cattle in several studies in Nigeria by Agu et al. (1990) in Kaduna; Agu & Amadi (2001) in Ebonyi; Ademola & Onyiche (2013) in Oyo; Okorafor & Nzeako (2014) in Oyo; and Enogiomwan et al. (2019) in Calabar who reported prevalence of 9.4%, 3.9%, 6.67%, 5%, and 7.78% respectively in cattle. However, Adua & Idahor (2017), Kamani et al. (2010), Zawua et al. (2015) and Enwezor et al. (2009), reported higher prevalence of 20.1%, 25.7%, 29.9% and 13.5% across some states in Nigeria. The 12.25% haemoparasitism observed in this study suggest an incessant challenge by parasites and existence of carrier state of most animals (Okorafor & Nzeako, 2014). The high prevalence of Babesia spp 6.75% and *Anaplasma* spp 5.0% recorded in this study could be attributed to the abundance of vector responsible for their transmission as both are tick-borne parasite. The fact that *Anaplasma* can be transmitted by several means (biologically by ticks and mechanically by biting flies) could have been the cause of its high prevalence in this study (Abdullah et al., 2019). Similar studies by Paul et al. (2016) in Maiduguri and Enogiomwan et al. (2019) in Calabar recorded prevalence of 9.9% and 5.8% of *Anaplasma* in cattle. The observed 0.25% of *Trypanosoma* was lower than the 8.4% reported by Enwezor et al. (2009) in Kaduna state, 8.0% by Kamani et al. (2010) in north-central Nigeria and 3.81% by Okorafor & Nzeako (2014) in Oyo state. The 0.25% prevalence of Microfilaria observed in the present study is lower than 1.4% reported by Kamani et al. (2010). Disparities in prevalence of haemoparasites of cattle recorded in this study could be attributed to the

| Table 1: Prevalence (%) of haemoparasites of cattle slaughtered in Jalingo abattoir |
|-------------------------------|----------------|----------------|----------------|----------------|
| Animal examined | No. examined | Haemoparasite | No. positive | Prevalence % |
|-----------------|-------------|----------------|---------------|--------------|
| Cattle | 400 | *Anaplasma* spp | 20 | 5.0 |
| | | *Babesia* spp | 27 | 6.75 |
| | | *Microfilaria* spp | 1 | 0.25 |
| | | *Trypanosoma* spp | 1 | 0.25 |
| Total | 400 | | 49 | 12.25 |

| Table 2: Sex related prevalence of haemoparasites of cattle slaughtered in Jalingo abattoir |
|---------------------------------|----------------|----------------|----------------|
| Sex of cattle | No. examined | No. positive | Prevalence (%) |
|-----------------|-------------|---------------|---------------|
| Male | 160 | 16 | 10.0 |
| Female | 240 | 33 | 13.75 |
| Total | 400 | 49 | 12.25 |

($\chi^2 = 0.262 df = 1, p > 0.05$)

| Table 3: Breed related prevalence of haemoparasites of cattle slaughtered in Jalingo abattoir |
|-----------------------------------------------|----------------|----------------|----------------|
| Breed | No. examined | No. positive | Prevalence % |
| Adamawa Gudali | 50 | 3 | 6 |
| Red Bororo | 64 | 7 | 10.94 |
| Sokoto Gudali | 20 | 2 | 10 |
| White Fulani | 266 | 37 | 13.91 |
| Total | 400 | 49 | 12.25 |

($\chi^2 = 0.441 df = 3, p > 0.05$)

| Table 4: Age related prevalence of haemoparasites of cattle slaughtered in Jalingo abattoir |
|-----------------------------------------------|----------------|----------------|----------------|
| Age (Years) | No. examined | No. positive | Prevalence % |
| >1-5 (young) | 56 | 8 | 14.29 |
| >5-10 (Adult) | 138 | 16 | 11.59 |
| >10 (Old) | 206 | 25 | 12.14 |
| Total | 400 | 49 | 12.25 |
difference in time of the study, breeds of animals sampled, differences in sample size, the diagnostic tool used, the management and nutritional status of animals sampled (Abdullah et al., 2019). Variations in geographical location (Velusamy et al., 2014) arbitrates the distribution of arthropod vectors of parasites (Agbede, 2013) and regular use of chemoprophylaxis and acicides by farmers could also account to local differences in the prevalence of haemoparasites (Ademola & Onyiche, 2013). In female 13.75% (33) than in males 10.0% (16) confirms the reports of previous studies in Nigeria (Agu et al., 1990, Agu & Amadi, 2001; Enwezor et al., 2009; Kamani et al., 2010 and Okorafor & Nzeako, 2014) who attribute the accumulation of parasites by the females due to the extended breeding for economic reasons such as calving and milk production. The susceptibility of cows might also be attributed to reduced immunity as a result of stress due to pregnancy and lactation (Okorafor & Nzeako, 2014). The effects of age on prevalence of haemoparasites has been previously reported by Okorafor & Nzeako (2014). The highest prevalence was observed in the White Fulani 37 (37.91%). This contradicts previous studies by Okorafor & Nzeako (2014) and Adua & Idahor (2017) who reported higher prevalence of haemoparasite in Sokoto Gudali and Red Bororo Breeds. Woolaston et al. (1991) reported that there could be genetic variations in resistance to parasites among ruminants. Therefore, a concerted effort to develop haemoparasite resistant species of cattle and goats is compulsory in order to boost animal production. Breed-related haemoparasite did not vary significantly ($\chi^2 = 0.441, df = 3, p > 0.05$) in the study.

The result of the present study indicates that haemoparasites are prevalent among cattle in the study area affecting 12.25% of the different cattle breeds in the area. Four haemoparasites; Anaplasma, Babesia, Microfilaria, and Trypanosoma were identified. Thus, routine Screening of haemoparasites carrier status is essential for prompt diagnosis and implementation of control measures to prevent economic losses in cattle.

Conflicts of Interest
The authors declare no conflict of interest.

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