Asian Journal of Biology

4(1): 1-5,2017; Article no.AJOB.35575
ISSN: 2456-7124

Haematological Evaluation of Haemoparasites in Cattle and Goats Slaughtered at Lafia Abattoir, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author MMA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KOI managed the analyses of the study, managed the literature searches and wrote the final draft. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJOB/2017/35575
Editor(s):
(1) Paola Angelini, Department of Chemistry, Biology and Biotechnology, University of Perugia, Perugia, Italy.
Reviewers:
(1) Marlene Tiduko Ueta, Universidade Estadual de Campinas, Brazil.
(2) Wagih Mommtaz Ghannam, Mansoura University, Egypt.
Complete Peer review History: http://prh.sdiarticle3.com/review-history/21053

Original Research Article

Received 20th July 2017
Accepted 7th August 2017
Published 19th September 2017

ABSTRACT

Haematological evaluation is generally used to determine the health conditions of farm animals. Animals with normal blood compositions (without parasites) are believed to likely perform more efficiently. Essentially, evaluation of blood offers the opportunity to inspect the health status of an animal earmarked for human consumption to ascertain the meat quality and safety. Yet, little is known about possible haemoparasitism among the animals slaughtered at Lafia abattoir hence this study was conducted. Blood samples were collected from a total of 114 animals (comprising 80 cattle and 34 goats) at Lafia abattoir and screened for the presence of haemoparasites. It was observed that *Anaplasma marginale* (6.1%), *Babesia bovis* (7%), *B. motasi* (3.5%) *and Trypanosoma vivax* (3.5) were the haemoparasites species found in cattle. Whereas *Theileria mutans* (2.6%), *Theileria ovis* (5.3%), *Anaplasma ovis* (2.6%) and *Trypanosoma ovis* (1.8%) were the cases recorded in goats. Breed resistance was not observed as all the breeds were infected with one species or the other. White Fulani had the highest (8.8%) cases among the cattle breeds and the least case (3.5%) was recorded in Sokoto Gudali while in goats, highest case (9.6%) was

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recorded in Red Sokoto breeds. Packed cell volume of the infected animals was significantly influenced by the presence of haemoparasites, possibly suggesting that haemoparasitism was endemic in cattle and goats reared in the study area. Yet, both the infected and non-infected animals studied were somewhat not anaemic. Therefore, cattle and goats slaughtered at Lafia abattoir were probably safe for human consumption.

Keywords: Abattoir; blood; infection; parasites; ruminant animals.

1. INTRODUCTION

Among all the livestock that make up the farm animals in Nigeria, cattle and goats constitute larger proportion and they are often reared by families in extensive and to an extent semi intensive system. Nigeria has population of 34.5 million goats and 13.9 million cattle [1]. Cattle and goats play significant roles in the food chain and overall livelihoods of rural households especially women and children [2]. These animals can be reared for various reasons such as income generation, religious purpose, household consumption, hobby as well as security against crop failure. According to [3] small ruminants in southern Nigeria are integral component of the household, where they contribute to the cultural, food and socio-economic life of the people.

Cattle in Nigeria may be infected with a wide variety of vector-borne haemoparasites [4]. According to [5], the most economically important genera are the Trypanosomes (*Trypanosoma vivax, T. congolense* and *T. brucei*), Babesia (*Babesia bigemina, B. bovis*) Anaplasma, Ehrlichia (Cowdria) and Theileria (*Theileria parva* and *T. veilifera*). It was postulated [6] that African animal trypanosomosis, babesiosis and cowdriosis are considered as the most important threat to health and improved productivity of cattle in sub-Saharan Africa. This may lead to death of the animals depending on the load of parasitic infection. It was stated that small ruminants in sub-Saharan Africa were infected with a wide variety of vector-borne prokaryotic and eukaryotic haemoparasites. Hence, the reduced meat and other product quality emanating in colossal lose and high cost of production. According to [7] the haemoparasites that inhabits the blood of small ruminants included Anaplasma, Babesia, Ehrlichia, Eperythrozoon, Theileria and Trypanosomes. Of these, the most economically important genera were given as Rickettsiae, Anaplsma, Ehrlichia, Theileria, Babesia and Trypanosomes [6].

Generally, haemoparasites cause destruction of the red blood cells resulting in anaemia, jaundice, anorexia, weight loss and infertility [8]. Also, some of these pathogenic parasites particularly the zoonotic types infect humans where they distort the body chemistry leading to ill-health. Although the health status, carcass yield and foetal deaths of animals slaughtered in the same study area has been reported [9]. It is imperative to also know the rate of parasites infection in the animals earmarked for human consumption in the area. Therefore the aim of this study was to determine the prevalence of haemoparasites in cattle and goats slaughtered at Lafia Abattoir.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted at Lafia Central Abattoir at Lafia Local Government Area, Nasarawa State with about 330,712 inhabitants [10]. Lafia is located on latitude 08°35'N, longitude 08°34'E with an altitude of 181 m above sea level, temperature ranging from 32 to 35°C, relative humidity between 58 and 63%, average day light of 9 to 12 h and average rainfall of 1, 400 mm per annum [11]. The vegetation consists of different species of trees, shrubs, leguminous browse plants and grasses with fairly undulated terrain. Farmers in the area keep livestock such as cattle, poultry, goat, sheep and pig. It has a tropical climate with two distinct season's i.e. wet and dry season with the wet season spanning from April to about September and dry season covering October to March.

2.2 Blood Collection

The cattle and goats were restrained with rope and 2 mls of blood was collected through the jugular vein of each of the animals using syringe and needle. Blood samples were collected in bottles containing ethylene diamine tetra acetic acid and were labelled appropriately. The samples were promptly transported to the Parasitology Laboratory Unit, Dalhatu Araf Specialist Hospital, Lafia, for haemoparasites screening as prescribed by [12].

2.3 Data Collection and Analysis

Haemoparasite species frequency of occurrence was recorded and analysed using simple descriptive statistics but the packed cell volume values were analysed using [13].

3. RESULTS

Haemoparasite species found in cattle and goats slaughtered at Lafia abattoir are presented in Table 1. Different species of haemoparasite were found in both cattle and goats slaughtered. In a total of eighty cattle examined, 23 representing 20% were observed to be infected with haemoparasites. Similarly, out of 34 goats screened for haemoparasites, 14 (12.3%) were infected with varieties of haemoparasites. In cattle, *Anaplasma marginale* (6.1%), *Babesia bovis* (7%), *Trypanosoma vivax* (3.5%) and *Babesia motasi* (3.5%) were found whereas, *Theileria mutans* (2.6%), *Theileria ovis* (5.3%), *Anaplasma ovis* (2.6%) and *Trypanosoma ovis* (1.8%) were observed in goats.

Table 2 shows the influence of breeds on heamoparasites prevalence rate in cattle and goats slaughtered at Lafia abattoir. All the breeds of cattle and goats examined were infected and the highest prevalent rates were recorded in Red Sokoto (9.6%), White Fulani (8.8%) and Red Bororo (7.9%) in that order.

The anaemic status of cattle and goats slaughtered at Lafia abattoir is shown in Table 3. There were significant differences ($P<0.05$) between non-infected and haemoparasites infected cattle and goats examined. It was observed that the non-infected cattle had packed cell volume of 33.14±4.00 which was statistically higher ($P<0.05$) than 30.26±4.65 recorded in the infected ones. Similarly, the non-infected goats had 28.5±5.68 compared ($P<0.05$) to 27.86±6.41 recorded in the haemoparasites infected ones.

4. DISCUSSION

Results revealed that the cattle and goats examined were infected with different species of haemoparasite. Thus, confirmed the reports of previous studies on range of haemoparasites found in cattle [14,15,16,5] as well as in sheep and goats [17]. The seemingly high infection rates observed in both cattle and goats in this study probably indicated that haemoparasites are endemic in the study area. More so, it suggested that cattle and goats are perhaps susceptible to the species of haemoparasite prevalent in the area. This observation could be responsible for low productive and reproductive performance of cattle and goats reared at Lafia metropolis as speculated by [9]. More significantly, vectors of these haemoparasites such as *Dermacentor andersoni* and *Ornithodorus moubata* (tick species) were reported to be found in cattle breeds reared in Nasarawa State [18]. Therefore, there might be a threat of zoonosis among animals and humans in the area [19,20]. Zoonosis is a disease that can be transmitted to humans from animals. Transmission occurs when an animal infected with bacteria, viruses, parasites, and fungi comes into contact with humans (Excerpt from: http://www.news-medical.net/health/What-is-a-Zoonosis.aspx).

It was shown that all the breeds examined were infected with one species of haemoparasites or the other, indicating that there was possibly no breed resistance capability among the animal species studied. This observation somewhat contradicted the reports of [21] that breeding for resistance to infectious diseases may be possible in ruminants and [22] that there could be genetic variations in resistance to parasites among ruminants. Therefore, a concerted effort to develop haemoparasites resistance species of cattle and goats is compulsory in order to boost animal production. This may also enhance animal protein availability in the area.

Table 1. Haemoparasite species found in cattle and goats slaughtered at Lafia abattoir

Cattle (n = 80)			Goats (n = 34)		
Haemoparasite species	**Freq.**	**%**	**Haemoparasite species**	**Freq.**	**%**
Anaplasma marginale	7	6.1	*Theileria mutans*	3	2.6
Babesia bovis	8	7.0	*Theileria ovis*	6	5.3
Trypanosoma vivax	4	3.5	*Anaplasma ovis*	3	2.6
Babesia motasi	4	3.5	*Trypanosoma ovis*	2	1.8
Total	**23**	**20.1**	**Total**	**14**	**12.3**

Freq.: Frequency; n: Population size

Table 2. Influence of breeds on haemoparasites infection rate in cattle and goats slaughtered at Lafia abattoir

Parameters	Sample size	Infection rate	%
Cattle			
Breeds: White Fulani	53	10	8.8
Sokoto Gudali	15	4	3.5
Red Bororo	12	9	7.9
Total	**80**	**23**	**20.2**
Goats			
Breeds: Red Sokoto	27	11	9.6
W.A.D	6	2	1.8
Sahel	1	1	0.9
Total	**34**	**14**	**12.3**

WAD: West African Dwarf

Table 3. Mean packed cell volume of cattle and goats examined for haemoparasites burden

Parameter	Cattle			Goats		
	Infected (n = 23)	**Non-infected (n = 57)**	**Prob.**	**Infected (n = 14)**	**Non-infected (n = 20)**	**Prob.**
PCV (X±STD)	30.26±4.65[b]	33.14±4.00[a]	0.00	27.86±6.41[b]	28.5±5.68[a]	0.03

PCV: Packed cell volume; X: Mean; STD: Standard deviation; n: Population size; Prob.: Probability

Packed cell volume of the haemoparasites infected cattle and goats were within the range of 24 to 46% given in healthy animals [23,24]. Consequently, the slaughtered animals were probably not anaemic thus the meat quality may not have been affected. However, they were observed to be scraggy buttressing the observation of [9] that most of the animals earmarked for slaughter in the same study area were emaciated.

5. CONCLUSION

Varieties of haemoparasite species were found in both cattle and goats slaughtered at Lafia abattoir yet, they were seemingly not anaemic thus the expected meat and meat products may be safe for human consumption. Breed type apparently did not prove any resistance to the prevalent haemoparasites hence, the need for frantic efforts to develop hybrid vigour that may be tolerant to parasitism in the area. Consequently, regular administration of veterinary drugs may be necessary, to prevent and control haemoparasites in farm animals reared in the study area. This perhaps may ensure quality meat and meat products availability required for human growth and development.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://prh.sdiarticle3.com/review-history/21053