Evaluation of Hemoparasites in Trade Cattle Slaughtered In Jos Abattoir, Plateau State-Nigeria

Olabode, H O.K.*, Jegede, O.C², Ajagbonna, O.P³, Adah, B.M.J., and Obafemi, F.A⁴

Department of Veterinary Microbiology, University of Abuja, NIGERIA

2. Department of Veterinary Parasitology, University of Abuja, NIGERIA
3. Department of Veterinary Pharmacology and Toxicology, University of Abuja, NIGERIA
4. Department of Veterinary Physiology and Biochemistry, University of Abuja, NIGERIA

*Corresponding Author: olabodeok@yahoo.com
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Abstract

Reports of increasing poor livestock production performance associated with hemoparasitism especially in cattle premises this hematological survey. This was conducted in order to establish the commonly encountered hemoparasites in slaughtered trade cattle in Jos abattoir between February-July 2011. Three hundred and twelve (312) blood samples were collected and analyzed at the Central Diagnostic Department and Parasitology laboratory, National Veterinary Research Institute Vom. The overall hemoparasitic infections showed that 172 (55.1%) cases revealed different types of hemoparasites with Babesia bovis in 64 (20.5%), Babesia bigemina in 36 (11.5%), Anaplasma spp in 41 (13.1%), Trypanosoma vivax in 27 (8.7%), and Theileria spp in 4 (1.3%) these hemoparasitic group was significant p<0.05 over the 132 slaughtered cattle devoid of hemoparasites. Out of the 40 (12.8%) cattle associated with anemia, 20%, 12.5%, and 67.5% was associated with Anaplasma spp, Babesia bigemina and Trypanosoma vivax respectively. The total white blood count (TWBC) revealed 8 (2.6%) and 32 (10.3%) cattle with lower and high White Blood Count (WBC) respectively, above the normal range as observed in 208 (66.7%). Mood median test for hemoparasitic occurrence in relation with packed cell volume and total white blood count by Chi-Square square analysis was significant p<0.05 (X²=3.94, Df = 1, and P = 0.047) with 13.333 ± 6.887 confidence interval at 95% for anemia group and 33.0 ±12.267 for TWBC group respectively.

In conclusion, this finding showed the occurrence of bovine hemoparasites in slaughtered cattle which was associated with anemia and by implication a contributing factor to poor herd production performance due to anaplasmosis, babesiosis, and trypanosomiasis. Ectoparasite (vector) control as well as prophylactic chemotherapy and possible use of anti-tick vaccine is hereby recommended in farms and herds.

Keywords: Hemo-parasites, trade cattle, Jos abattoir.

Introduction

Livestock sub-sector is an important and strategic agricultural component that generates income for human livelihood in Africa especially Nigeria (Ahmed, 2002). Livestock provides major sources of protein (meat and Milk), hide and skin, bone and bone meal for livestock feeds , raw material for other agro based industries as well as providing employment for both rural and urban dwellers engaging in production and marketing of livestock and its by-product (Maisamari, 2002). They also play significant role in proving manure and draft power (Tanko, 2002). Of the different ruminants reared in the country, cattle are the most commonly
domesticated. Indigenous breeds include the Zebu breeds (Sokoto Gudali, Rahaji, Bunaji and Wadara) and the humpless breeds (Kuri, Muturu and N’dama) (Kumshe; et al., 1997). Over 90% of these cattle are trade animals which are grazed over wide range of uncultivated pasture by nomadic herdsmen (ILCA, 1987). However, hemoparasitism in cattle, particularly those caused by trypanosomes, tick borne infections and ectoparasites are important sources of losses to the industry world-wide including the tropics (FAO, 1991; Kocan, 1995). The blood sucking activity of ticks, irritation and destruction to hides and skins of infested animals, in addition to their role as vectors and intermediate hosts to a number of important protozoal and rickettsial diseases as well as parasites of the circulatory systems are well documented (Taylor, et al., 2007). These diseases adversely affect the productivity and market value of these cattle which they infect (Byford; et al., 1992). The reported negative impacts of hemo-parasites and ectoparasites on husbandry, productivity and welfare of domestic animals particularly cattle was highlighted (Colebrook and Wall, 2004; Olabode; et al., 2010). Similar hemoparasitic studies in cattle were conducted earlier by Kumshe; et al., (1997); Glaji; et al., (2005) in other parts of the country. The need for update information on possible hemoparasites and their associated diseases necessitated this investigation in slaughtered cattle consumed in the study area. Therefore, this survey seeks to establish the occurrence of hemoparasites and associated diseases prevalent in trade cattle slaughtered at the Jos abattoir, Plateau state - Nigeria.

Material and Methods

Study area: Jos is a city and the administrative capital of Plateau state in the middle belt of Nigeria. It is located on 9°86’ N and 8°90’ E high on the Jos Plateau covered by grassland with a moderate temperate climate and a monthly average temperature range of 20° – 25°C (Anon, 2011a). The city is divided into three local government areas namely Jos-North, Jos-South, and Jos-East with an altitude of 4,062 feet (1,217m) above sea level and the state is further subdivided into seventeen Local Government Areas with over forty ethno-linguistic groups. Plateau State is bordered by (Bauchi State) to the north east, (Kaduna State) to the north- west (Nasarawa State) to the south west and (Taraba State) to the south east (Anon, 2011b) as these border states serve as trade cattle market source for the state.
The abattoir is sited at Giring ‘village’ within the Jos south, it is popularly called abattoir and it is located about 6km away from the Jos main market in the northwards direction, bordered by millionaires quarters on the east, Dogon karafe settlement on the west and Air force military school/Ray field settlement in the southward direction.

**Study population/animals:** All the cattle that were brought for slaughter at Jos abattoir within the study period from other northern states were considered for this investigation. These animals are kept in the lairage on arrival to rest for a minimum of 24-48hrs depending on the travel distance, traumatic injuries and the consent of cattle owner before slaughter. The livestock superintendent is usually notified prior to slaughter of these cattle.

**Sample technique and sample size:** Random sampling method was employed amongst cattle slaughtered in the study area. The sampling was conducted on a weekly basis between February and July 2011 which amounted to 312 (Three hundred and twelve) cattle blood samples considered for this survey.

**Sample collection:** Five milliliters of blood was collected from each animal post slaughter into plastic bottle (maxicomR) containing ethylenediamine- tetraacetic acid (EDTA) as anticoagulant. These samples were transported to the Central Diagnostic Department and Parasitology laboratory, National Veterinary Research Institute, Vom on cold ice packs and stored at 4°C until.

**Hematological analysis:** Packed Cell Volume (PVC) was determined by the microhaematrocit technique and total white blood cell counts were done by the use of Neubauer haemocytometer as described (Jain, 1993). Haematocrit buffy coat technique was used to detect Trypanosomes as described (Paris et al., 1982). Thin and thick blood smears were made, fixed with methanol and stained with Giemsa as described by Jain, (1993) for detection and identification of haemoparasites. PCV values of 24% and or less were regarded as anemic and Total White Blood Count (TWBC) 4.0 – 12.0 x 10^9L was regarded as normal range (Coles, 1980).

**Data analysis:** All data was expressed as frequency and percentage, which was further subjected to Chi square goodness of fit was also used to measure the association (hemoparasitic versus non-hemoparasitic cattle as well as the PCV and TWBC parameters) as described by Mahajan, (1997).
Results

The PCV of all the 312 cattle examined was in the range between 19-48%. Out of these, 40 (12.8%) cattle had packed cell volume of 24% and below that was regarded anemic (Table I). *Anaplasma spp*, was seen in 8 cases while 5 and 27 cases was attributed *Babesia bigemina* and *Trypanosoma vivax* respectively. The total number of cases including those not anemic was 172/312 (55.1%) (Table II) but showed hemoparasites which included *Babesia bovis* 64/312 (20.5%), *Babesia bigemina* 36/312 (11.5%), *Anaplasma spp* 41/312 (13.1%), *Trypanosoma vivax* 27/312 (8.7%) and *Theileria spp* 4/312 (1.3%), these hemoparasitic group was significant over 132/312 (42.3%) cattle slaughtered devoid of hemoparasites. *Trypanosoma vivax* was associated with anemia caused by trypanosomes while a mixed occurrence of *A. marginale* and *A. centrale* was responsible for the anemia associated to anaplasma infection. The total leukocyte count showed 8/312 (2.6%) were below the normal range, 208/312 (66.7%) were within normal range (4.0-12.0 X 10^9 L) and 32/312 (10.3%) was above the range (Table I). Hematological findings in cattle infested with hemoparasites showed normocytic normochromic anemia. Mood median test for Hemo-parasitic occurrence in relation with packed cell volume and total white blood count by Chi-Square square analysis = 3.94, Df = 1, and P = 0.047. There was difference between anemia group and TWBC group p< 0.05 level of significance with confidence interval at 95% for anemia group =13.333 ± 6.887 and TWBC group = 33.0 ±12.267.

Table 1: Hemo-parasitic occurrence in relation with packed cell volume and total white blood count

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Pack Cell Volume (PCV) %</th>
<th>Number Cattle</th>
<th>Frequency (%)</th>
<th>Hemo-parasites</th>
<th>Total White Blood Count (x 10^9 L)</th>
<th>Number Cattle</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Below 24</td>
<td>40</td>
<td>12.82</td>
<td>8-Anaplasma spp; 27-T.vivax 5-B.bigemina,</td>
<td>Below 4.0</td>
<td>8</td>
<td>2.56</td>
</tr>
<tr>
<td>2.</td>
<td>24-46</td>
<td>232</td>
<td>74.35</td>
<td>64-B.bovis, 31-B.bigemina, -33-</td>
<td>4.0 – 12.0</td>
<td>208</td>
<td>66.67</td>
</tr>
</tbody>
</table>
Table 2: Frequency distribution of hemoparasites in slaughtered cattle in Jos abattoir

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Type of Hemo-parasites</th>
<th>Number of cattle</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><em>Babesia bovis</em></td>
<td>64**</td>
<td>20.5</td>
</tr>
<tr>
<td>2.</td>
<td><em>Babesia bigemina</em></td>
<td>36**</td>
<td>11.5</td>
</tr>
<tr>
<td>3.</td>
<td><em>Anaplasma spp</em></td>
<td>41**</td>
<td>13.1</td>
</tr>
<tr>
<td>4.</td>
<td><em>Trypanosoma vivax</em></td>
<td>27**</td>
<td>8.6</td>
</tr>
<tr>
<td>5.</td>
<td><em>Theileria spp</em></td>
<td>4**</td>
<td>1.3</td>
</tr>
<tr>
<td>6.</td>
<td>No parasites</td>
<td>132</td>
<td>42.3</td>
</tr>
<tr>
<td>7.</td>
<td>Unclassified</td>
<td>8</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>312</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Key: NPF: No Parasite Found

P value 10.828** **P<0.001

Discussion

In this study, the relationship between the Pack Cell Volume (PCV), total white blood count (TWBC) and the presence of hemoparasites were evaluated. The PCV values were used as the parameter to identify anemic cases from the overall 172/312 (55.1%) hemoparasitic infected cattle sampled. The anemia observed in this study was associated with *Anaplasma spp*, *Babesia bigemina* and *Trypanosoma vivax* infestation. This is similar with earlier reports of Valli et al., (1978); Kumshe et al., (1997) in cattle with hemoparasitism associated *Babesia* and *Trypanosoma*. However, morphological classification of anemia is of little diagnostic importance because diseases associated with anemic conditions are dynamic; the cellular morphology varies with the progression or regression of diseases (Jubb et al., 1992). The presence of *Trypanosoma vivax* detected by Hematocrit Centrifuge Technique (HCT) analysis connotes findings of Isamah and Ostesile (1997) earlier documented that high prevalence of trypanosomes tends to increase between February and March annually, they further emphasized that Tsetse (*Glossina spp*.) and trypanosomiasis have for many years been regarded as the most important constraints on cattle production within the Nigerian Middle Belt. Today, with almost half the national cattle herd resident in this region of the country throughout the year, this trend obviously can no longer be
the case due to the decline of tsetse and trypanosomiasis as result of deforestation and the removal of wildlife which have greatly reduced the natural habitats and wildlife hosts of the tsetse fly over much of the country. The gradual extinction through natural selection and co-adaptation which has led to the evolution of milder forms of the disease and the development of some trypanosomiasis-tolerant zebu cattle populations as suggested by Bourn et al., (1994) could be associated with the low and single species of trypanosome in the samples analyzed. *Theileria spp* are generally regarded as mild pathogenic parasites (Soulsby, 1982) and its ability to produce severe anemia is dependent on concurrent infections. The detection of *Theileria spp* (1.3%) in some samples with extremely low (2.6%), while the high (10.3%) Total white Blood Count (TWBC) in slaughtered cattle could be attributed to an indication of a concurrent ongoing infection caused by another potential hemoparasite and or micro-organism which may have required further elucidation. In conclusion, most of the cattle slaughtered in Jos abattoir during the study period were within normal hematological parameters and were apparently healthy, although they were associated with hemoparasitism only a few were anemic due to anaplasmosis, babesiosis, and trypanosomiasis. Hence, this finding provides preliminary information on the occurrence and potential risk of hemoparasitism on cattle health and production in and around the study area. Hence hemoparasitic borne ectoparasite and vector control as well as prophylactic chemotherapy is hereby recommended in farms and Fulani herds. In addition, the possible use of commercially available anti-tick vaccine (Tick gard™) should be explored.

**Acknowledgement**

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**Reference**


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