Survey of Haemoparasites and Haematology of Scavenging Ducks (*Anas Platyrhyncha*) in Owerri Southeastern Nigeria

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Survey of Haemoparasites and Haematology of Scavenging Ducks (*Anas Platyrhyncha*) in Owerri Southeastern Nigeria

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Abstract

A study was carried out to investigate the haematological parameters and haemoparasites of naturally infected adult scavenging ducks in Owerri, southeastern Nigeria. Blood samples were collected from them for haematology and parasitological examinations. Out of the 200 ducks examined, 120 (40%) were infected with haemoparasites. Of these, 100 (83.3%) were infected with *Leucocytozoon*, while 20 (16.7%) had *Trypanosoma* infection. PCV and Hb values of the non–infected ducks were significantly (*p < 0.05*) higher than the infected ones. Their values of the RBC, MCV and MCH were equally higher, but not significant (*p > 0.05*). WBC, Neutrophils, Eosinophils and Lymphocytes were higher (*p < 0.05*) in the infected than non–infected ducks. Across sexes, infection in the 40 (33.3%) drakes was accounted for solely by *Leucocytozoon*, while the 80 (66.7%) infected ducks had 75% and 25% infections by *Leucocytozoon* and *Trypanosoma* organisms respectively. The male duck (drake) had significantly higher total WBC count (*p*<0.05) but significantly lower RBC count (*p*<0.05). However, the values of PCV, Hb, MCH, MCHC and MCV were similar in the two sexes. It was concluded that *Leucocytozoon* and *Trypanosoma* species are prevalent among scavenging local ducks reared in Owerri, Imo state and could be responsible for the microcytic normochromic anaemia and leucocytosis among these birds, thus, adversely affecting their productivity.

Keywords: Haemoparasites, haematology, scavenging, ducks, owerri, southeast, Nigeria.
Introduction

Domestic ducks are raised throughout the tropics, but are abundantly more in regions of high rainfall, riverine areas, delta and coastal districts (Obinne et al., 1999). Under extensive management, which is their most common system of management in the rainforest zone of southern Nigeria, ducks form efficient scavengers and foragers of household wastes (Ogundele, 1991; Okewo and Odeyemi, 1998). Even under adverse conditions such as high rainfall, temperature, excessive humidity and poor housing, ducks exceed the best of laying strains of chicken in livability (Ola, 2000). They also have the additional advantage of immunity to the most prevalent disease problems of gallinaceous birds within their habitation (Oluyemi and Roberts, 1979).

In southeastern Nigeria and precisely Owerri, local ducks are ubiquitous and are kept for sale and home consumption under a subsistent level of management (Okeudo et al., 2003). Nigerian local ducks are known to be good meat producers and interestingly have the ability to withstand extremely hot ambient temperatures better than chickens (Oluyemi, 1973; Oluyemi and Roberts, 1979; Obinne, 1997). However, under the extensive system of management in which the birds are confronted with a plethora of infective organisms, they perform rather poorly and remain prejudiced poultry species in much of the areas where they are found in Nigeria (Oluyemi, 1973). Thus, duck rearing is hindered by various problems, of which parasitic infections is one of a major problem.

Many recent studies have focused on avian blood parasites as a model system for host-parasite interactions in an evolutionary and ecological context (Bensch et al., 2004; Hellgren et al., 2004 and Ricklefs et al., 2005). For instance, Leucocytozoon produces inappetence, weakness listlessness, dyspnea, anaemia, leukocytosis and sometimes death within 24 hr (Springer, 1997).

The actual potential of this Mallard duck under the humid tropical conditions of Nigeria remains largely unknown (Ola, 2000). Improving the productivity of any animal necessitates the understanding of its physiology, including the hematological characteristics in health and diseases. Hematological studies are usually undertaken to establish the diagnostic baselines of blood characteristics for routine management practices of farm animals (Orji et al., 1986a and b; Sulaiman et al., 2010). For instance, hematological constituents usually reflect the physiological responsiveness of the animal to its external and internal environments and thus serve as a veritable tool for monitoring animal health and disease (Pascalonpekelniczky et al., 1994; Pascalonpekelniczky et al., 1996).

Since strong differences are reported between hematological characteristics of local breeds of ducks from different geographical and agricultural zones of the world (Sturkie, 1986; Warren, 1972), there is the need to establish the diagnostic blood profile of the Nigerian scavenging ducks when diseased. Thus, this study aims to establish the hematological values and blood parasites infecting ducks reared in Owerri, southeastern Nigeria.

Materials and Methods

Study Area

Owerri is the capital city of Imo State, a tropical rain forest region of Southeastern Nigeria. Imo State covers an area of 5,288sqkm. It is located between latitude 4º45’ and 7º15’ north and longitude 6º50’ and 7º25’ east (www.imostate.gov.ng).

The rainy season in Owerri, Imo State begins in March and ends in October with a break in August. The total rainfall decreases from 2200mm in the southern to 1900mm in the northern parts of the State. The hottest months range from January to March, when the mean temperature is above 27ºC. The relative humidity is usually high throughout the year, reaching a maximum during the rainy season when values above 90% are recorded. (www.imostate.gov.ng).

Experimental Birds and Blood Collection

Blood samples were taken between 8.00 am – 10.00 am daily for 8 weeks from the wing veins of 200 scavenging ducks, comprising 100 drakes and 100 female birds, with the aid of 5mL syringes and needles (23G). About 3 ml of blood was taken from each bird and put into Ethylene Di-amine Tetra
Acetic acid (EDTA) treated sample bottles for hematological and parasitological examinations.

**Parasitological Examination**

A drop of blood was later placed near one end of a clean glass slide and a spreader used to prepare the thin smear. The smear was allowed to air dry. The dried blood smear was fixed in Methyl alcohol (absolute) for 2 minutes and allowed to dry. The smears were placed on a staining rack and stained with 3% Giemsa stain for 30 minutes. After that, the smears were washed with phosphate buffered saline (PBS) to remove excess stains. The slides were then air-dried and examined under oil immersion (x100) lens for haemoparasites, according to Shah-Fischer and Say, (1989).

Haemoparasites in the slides were identified morphologically according to the methods earlier described by (Soulsby, 1982; Shah-Fischer and Say, 1989).

**Blood Analysis**

Blood samples were analyzed within 3 hours of their collection for total erythrocyte and leukocyte counts, hematocrit (PCV) and hemoglobin concentration according to the methods described by (Coles, 1982). Erythrocyte count (RBC) was done in a hemocytometer chamber. Total leukocyte count was obtained using a hematocytometer with Natt and Henrick’s diluent to obtain a 1:200 blood dilution. The number of leukocytes were thereafter estimated as total WBC/ul = number of cells to total WBC x 200. PCV was measured by the microhematocrit method with 75 x 16 mm capillary tubes filled with blood and centrifuged at 3000 rpm for 5 min. Hemoglobin (Hb) concentration was also measured by the cyanomethemoglobin method. Various hematological indices like mean corpuscular hemoglobin (MCH), mean corpuscular volume (MCV) and mean corpuscular hemoglobin concentration (MCHC) were calculated from results obtained.

**Statistical Analysis**

Data were expressed as simple averages and percentages, while the infected versus non-infected, male versus female means and standard deviation of each blood parameter were calculated. Student’s T test was applied to determine significance between these parameters (Steel and Torrie, 1980).

**Results**

Table 1 shows the results of the occurrence of haemoparasites of scavenging adult ducks (Anas platyrhyncha) reared in Owerri. Out of the 200 adult ducks examined, 120 (40%) were naturally infected with haemoparasites. Of these, 100 (83.3%) were infected with Leucocytozoon and 20 (16.7%), Trypanosoma species. Across sex, 80 (66.7%) of the female ducks were infected while 40 (33.3%) of the drakes were infected. Leucocytozoon and Trypanosoma species infected 60 (75%) and 20 (25%) of the females respectively. In the drakes, only Leucocytozoon sp was encountered with a prevalence of 40 (40%), while Trypanosoma sp was not observed among them.

<table>
<thead>
<tr>
<th>Sex of Duck</th>
<th>No (%) Exam.</th>
<th>No (%) Infected</th>
<th>No (%) infected with Leucocytozoon sp.</th>
<th>No (%) infected with Trypanosoma sp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>100 (50)</td>
<td>40 (33.3)</td>
<td>40 (40)</td>
<td>-</td>
</tr>
<tr>
<td>Female</td>
<td>100 (50)</td>
<td>80 (66.7)</td>
<td>60 (60)</td>
<td>20 (100)</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>120 (40)</td>
<td>100 (83.3)</td>
<td>20 (16.7)</td>
</tr>
</tbody>
</table>

Comparison of the haematological values of the non-infected and infected scavenging ducks in Owerri is shown in table 2. The RBC, MCV and MCH values of the non-infected ducks were higher, but not significant, while the PCV and Hb were significantly (p < 0.05) higher than in the infected ones. The values of the total WBC, Neutrophils, Eosinophils and Lymphocytes were higher (p < 0.05) in the infected than non-infected ducks.
SURVEY OF HAEMOPARASITES AND HAEMATOLOGY OF ...

Table 2: Comparison of Haematological values of non-infected and infected scavenging ducks reared in Owerri, Imo state.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean</th>
<th>Non-infected ± SE</th>
<th>Infected ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC (x 10^6/mm³)</td>
<td>3.22</td>
<td>3.49 ± 0.10</td>
<td>2.95 ± 0.11</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>43.59</td>
<td>46.00 ± 1.73</td>
<td>41.17 ± 1.13</td>
</tr>
<tr>
<td>Hb (%)</td>
<td>14.92</td>
<td>17.17 ± 0.29</td>
<td>12.67 ± 1.13</td>
</tr>
<tr>
<td>MCV (%)</td>
<td>13.54</td>
<td>13.91 ± 1.03</td>
<td>13.14 ± 0.15</td>
</tr>
<tr>
<td>MCH (%)</td>
<td>4.63</td>
<td>4.79 ± 0.24</td>
<td>4.47 ± 0.13</td>
</tr>
<tr>
<td>WBC (x 10^3/mm³)</td>
<td>24.53</td>
<td>23.79 ± 0.88</td>
<td>25.26 ± 1.62</td>
</tr>
<tr>
<td>Neutrophils (%)</td>
<td>13.67</td>
<td>10.33 ± 4.16</td>
<td>17.00 ± 1.27</td>
</tr>
<tr>
<td>Eosinophils (%)</td>
<td>6.25</td>
<td>0.67 ± 2.08</td>
<td>11.83 ± 2.64</td>
</tr>
<tr>
<td>Lymphocytes (%)</td>
<td>80.08</td>
<td>59.00 ± 3.61</td>
<td>101.17 ± 2.64</td>
</tr>
</tbody>
</table>

Means on the same row with different superscripts are significantly different (p<0.05).

An aspect of the hematological values of the scavenging ducks of Owerri, according to their sex is presented in table 3. Total White Blood cell counts were significantly (p < 0.05) higher in the drakes than female ducks, while the Red Blood Cell (RBC) count was higher (p < 0.05) in the ducks than in the drakes. The values of the PCV, Hb and MCHC were visibly higher in the females, but significantly similar, while the MCH and MCV values were higher in the drakes. However, these values were similar in both sexes.

Table 3: Haematological profiles of scavenging adult Ducks (Anas platyrhyncha) reared in Owerri, Imo state according to sex.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Male Mean ± SE</th>
<th>Female Mean ± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBC (x 10^6/mm³)</td>
<td>2.43 ± 0.58</td>
<td>2.83 ± 0.39</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>42.58 ± 5.67</td>
<td>43.76 ± 7.03</td>
</tr>
<tr>
<td>Hb (g/L)</td>
<td>136.10 ± 20.40</td>
<td>151.70 ± 22.20</td>
</tr>
<tr>
<td>MCHC (g/dl)</td>
<td>57.64 ± 9.04</td>
<td>54.41 ± 10.93</td>
</tr>
<tr>
<td>MCV (fl)</td>
<td>31.51 ± 1.09</td>
<td>35.81 ± 4.94</td>
</tr>
<tr>
<td>MCH (Pg)</td>
<td>183.06 ± 28.95</td>
<td>156.77 ± 31.30</td>
</tr>
<tr>
<td>WBC (X 10^3/mm³)</td>
<td>16.96 ± 2.23</td>
<td>0.72 ± 0.29</td>
</tr>
</tbody>
</table>

Means on the same row with different superscripts are significantly different (p<0.05).

Discussion

There is a dearth of information on the haemoparasites of scavenging local ducks of Nigeria and in Owerri Imo State in particular. This observation shows total lack of interest in the diseases of local ducks among Nigerian researchers. Hematological values often used in monitoring the health and disease status of such scavenging local ducks are scanty, even though these have been reported extensively in exotic breeds of ducks found in Nigeria and other parts of the world (Sturkie, 1986; Pascalonpekenczyk et al., 1994; Okeudo et al., 2003). The result of this study confirmed an obvious parasitism of scavenging local ducks (Anas platyrhyncha) reared in Owerri, Imo State, Nigeria.

The 40% occurrence of haemoparasites among ducks in this work is high, but partially agrees with Dey et al., (2008) who reported a prevalence of 60% in Bangladesh and not in conformity with the findings of other researchers like Osho and Agoi (2004), who reported a prevalence rate of 20% of duck haemoparasitism in south western Nigeria and Sengal et al., (2006), that reported 8.1% and 2.1% prevalence rates in two regions of Uganda for Anas platyrhyncha. The differences may be due to the fact that the finding in south western Nigeria was on Muscovy ducks, while that of Uganda may be attributed to themanagement practices, geographical location of this African country and probably season of the year that their research was carried out. Our study was conducted during the rainy season, as this is the period that the vectors of most
infecting pathogens thrive well. It has been reported that the tropical rain forest vegetation of southeastern Nigeria favours the breeding and multiplication of infective pathogens and their vectors (Nwoke, 2001). The gametocytes of *Leucocytozoon* occur in leucocytes or, in some species, in erythrocytes of birds and easily found in peripheral blood. It has been recorded to be a common haemoparasite of domestic ducks in sub Saharan Africa and elsewhere (Bhatia et al., 2012). This therefore supports the very high occurrence of this pathogen among the scavenging ducks reared in our study area. Moreover, the vectors of this organism, which are black flies of the genus *Simulium* or midges of the genus *Culicoides* are found in abundance in Owerri (Nwoke, 2001).

The occurrence of *Trypanosoma* organism in the blood of the ducks is expected since it has been reported (Osho and Agoi, 2004) that infections by *Trypanosoma* species are high and occur frequently in the riverine and forest areas of Nigeria than the savannah. Owerri is within the riverine vegetation belt of the country. Although, a number of avian trypanosomes have been reported, they are all non–pathogenic, but are transmitted by blood sucking arthropods, like mosquitoes, simuliiids and hyppoboscids (Kalu and Uduedgo, 1997; Bhatia et al., 2012). Some of these pathogens like simuliiids, are vectors of *Leucocytozoon* and also serve as same for avian trypanosomes.

More of these haemoparasites occurred in the female ducks than the drakes. Furthermore, the higherprevalence of these parasites among the female ducks compared with the drakes is in conformity with other reports (Opasina and Onyeka, 1982; Kalu and Uduedgo, 1997; Seifert, 1996; Opara et al., 2005). The significant difference in the red blood cell components (PCV and Hb) of the infected scavenging ducks is expected. It is on record (Blood and Radostits, 2000) that infection of red blood corpuscles by protozoan parasites lead to various forms of anaemia. In our study, the decreased MCH of the infected birds suggested that haemoparasites invasion of the blood cells resulted in a hypochromic type of anaemia. Again, there was significant rise in the totalleucocytes count and their differentials in the infected ducks. This agrees with Springer (1997), who posited that leukocytosis occurs in leucocytozoonosis and other haemoparasitism of Ducks. The overall mean values of RBC, PCV, Hb and WBC counts recorded in the present study were lower than the figures (3.22 x 10⁶/mm³; 43.59%; 14.92%; 24.53 x 10³/mm³) returned by Okeudo et al., (2003) for Muscovy ducks of southeastern Nigeria. These decreases could be attributed to either the impact of haemoparasitism in the scavenging local ducks we examined or as a result of species variation. However, our figures were higher than the 1.72 x 10⁶ mm³, 38.09%, 11.64 g/dl and 18.21 x10³m³ respectively, reported by (Ola et al., 2000) for local Muscovy ducks of southwestern Nigeria. It could also be that the birds these workers used had some forms of haemoparasitism and other unnoticed infections. It is also possible that our superior values reflect the advantage of freedom of choice of food during roaming, better nutrition and health status usually associated with scavenging animals (Opara et al., 2005).

The increase in mean cell volume (MCV) is in line with Aiello and Mays (1998) who reported that the values of MCH, MCV, MCHC and Hb are indicative of anaemia and that for anaemia to occur, MCV has to be high with normal MCHC and Hb. This suggested that there was a microcytic – normochromic type of anaemia among the ducks we used for this study, probably caused by the compromising effects of the parasites in their blood.

The values of WBC counts for the ducks used in this study were lower than those already reported by Ola et al., (2000) and Okeudo et al., 2003). Leucopenia (decreased WBC count) occurs in animals with certain disease conditions such as leucocytozoonosis.

The gametocytes of *Leucocytozoon* sp occur in leucocytes or, in some species, erythrocytes of birds, causing the destruction of such cells and resultant decrease in their counts (Bhatia et al., 012). This might be the reason for the unagreeable WBC counts observed in the ducks we studied. In agreement with our findings however, other researchers also reported leukocytosis in *Trypanosoma* infected Dogs (Ikede, 1972; Anosa, 1983), similar to what was observed in the ducks. Surprisingly and in the presence of infections, our RBC, PCV, Hb and MCHC values were higher in
females. This is in agreement with the higher values of the same parameters obtained in females by Ola et al., (2000) in Muscovy ducks of southwestern Nigeria. Mean MCH and MCV indices of males reported here on the other hand, were similar to those reported in the diving Duck, but different from the figures reported for adult female Mallards (Sturkie, 1986). Strong species and sex effects on avian hematological parameters in health and disease had been reported (Orji et al., 1986a).

Conclusion

The present knowledge of the haemoparasites of scavenging local ducks of Owerri, Imo State is of great importance and has confirmed their prevalence in these birds which were earlier assumed resistant to the diseases.

In addition, the haematological parameters of such birds should form important reference data for comparison with those from healthy ducks in routine diagnosis and management of diseases and nutritional problems of such animals in the region.

It is therefore advised that good management practices such as provision of highly nutritious feed, timely routine vaccination, treatment and adequate housing for the ducks will help to keep them healthy and productive.

Acknowledgement

We will like to appreciate the useful assistance of the peasant farmers of Owerri who gladly permitted us to bleed their Ducks, when majority of others refused. We also thank the laboratory Scientists of the Department of Public Health Technology, Federal University of Technology for their enthusiasm in analyzing the blood samples.

References


