

Effect of helminthosis on some blood parameters in pigs in Ibadan, Nigeria

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Abstract

Coprological and haematological investigations were carried out on faecal and blood samples collected from 154 pigs from various locations around Ibadan metropolis. Coprological examination consisted mainly of egg floatation techniques while haematological investigations consisted of packed cell volume (PCV), red blood cell count (RBC) and white blood cell count (WBC). Microscopic examination of smears of the blood samples for protozoan blood parasites was also carried out. Faecal samples of 56 (36.36%) pigs were positive for helminth parasites while all the blood samples were negative for protozoan parasites. The eggs of helminth parasites found in this study were those of *Ascaris* spp., *Metastrongylus* spp., *Globocephallus* spp., *Oesophagostomum* spp., *Paragonimus* spp., *Hyostrongylus* spp. and *Trichuris* spp. The mean PCV, RBC and WBC values of pigs negative for helminth parasites were $31.66 \pm 8.30\%$, $10.57 \pm 4.68 \times 10^6/\text{ml}$ and $16.97 \pm 7.82 \times 10^6/\text{ml}$ respectively while the values for positive pigs were $29.71 \pm 8.93\%$, $9.81 \pm 4.84 \times 10^6/\text{ml}$ and $17.34 \pm 7.24 \times 10^6/\text{ml}$ respectively. Helminthosis caused a decline in the mean values of PCV and RBC count. The percentage decline in mean PCV values was 6.13%, 8.43% and 1.64% respectively for large white, large white crossed and local breeds of pigs. The percentage decline in mean RBC values was 6.97%, 8.74% and 3.01% respectively for large white, large white crossed and local breeds of pigs. Helminthosis caused an increase in the mean WBC values in the three breeds which was 2.69%, 1.22% and 0.91% respectively for large white, large white crossed and local breeds of pigs. The implications of the findings are discussed. In conclusion, helminthosis caused a decline in the mean values of PCV and RBC values resulting in anaemia in all breeds of pigs while the mean WBC count increased. However, experimental infections of various breeds of pigs of different ages by various types of parasites need to be carried out in order to confirm the trend observed in this study.

Keywords: Effect, Helminthosis, Blood Parameters, Ibadan

Introduction

The livestock industry in tropical Africa consists of mainly cattle, sheep, goats, pigs and poultry (Resource Inventory and Management 1993). In Nigerian economy, the livestock sector accounts for 4.5% to 5% of the gross domestic products (GDP) (Shaw and Hoste, 1987). Approximately one-fifth of the world's pigs are found in the tropics and the production in the tropics is increasing more rapidly than the mid-latitude regions (Williamson and Payne, 1984). The swine industry has witnessed an unprecedented increase in production and

consumption over the past decade and this situation is likely to continue. This positive development means an increase in provision of animal protein for human consumption, employment generation, poverty reduction, contribution to the National GDP and general economic growth. Pigs are known to be prolific producers, and are capable of producing 20-30 piglets from 2 or 2½ litters per year. Their ability under efficient management and balanced nutrition to reach slaughter weight of 80-90kg in 7 to 8 months makes them one of the most efficient feed converters. In

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addition, swine production provides job opportunities for many Nigerians and various farm workers in piggery farms. It also provides job opportunities to those in the abattoirs during processing and the meat sellers in the market. In Nigeria, apart from poor management, which includes inadequate and unbalanced feeding, high disease prevalence and associated high neonatal mortality constitute a major obstacle to the promotion of large scale holding of livestock. Diseases depress every aspect of production, fertility is reduced, young stock grow poorly, milk yields are low, carcass quality is poor, affected animals lack stamina, mortality rates are high (Talabi *et al.*, 2010) and anaemia is common. Anaemia is a decrease of RBC values below the normal range and is clinically characterized by reduced exercise tolerance and pale mucous membranes (Kahn, 2005). Diagnosis of anaemia in the laboratory is based on decreased values of haemoglobin, PCV, RBC count, mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC). Aetiologies of anaemia in swine include haemorrhage, antigen-antibody reactions, gastro-intestinal parasites especially hookworms, *Trichuris suis* (the pig whipworm), *Strongyloides ransomi* (intestinal threadworm of swine), *Ascaris suum*, *Hyostrongylus rubidus* (the red stomach worm), *Oesophagostomum* spp., *Metastrongylus* spp. and *Stephanurus dentatus* and haemoparasites which include *Trypanosoma* spp., *Babesia* spp. and *Eperythrozoon* spp. (Kahn, 2005). Haemoparasites and gastro-intestinal parasites are important and cause considerable mortality and lack of vigour and un-thriftiness in young pigs. These parasites can be demonstrated by various parasitological techniques in the

laboratory. The effect of helminthosis on some blood parameters in pigs in Ibadan, Oyo State was investigated in this study.

Materials and methods

Location of study

The study was conducted at various locations around Ibadan metropolis where pigs are found in Oyo State, Nigeria and the laboratory work was done in the Laboratory of the Department of Veterinary Medicine, University of Ibadan. Ibadan covers an area of 70 square Kilometres and lies on the longitude 7.23° N, 3.5° E.

Sample collection

About 5 mL of blood was collected from the jugular vein at slaughter in the abattoir into sterile labelled bijoux bottles containing 250µl of 200 mM disodium ethylene diamine tetra acetic acid (Na₂EDTA) as anticoagulant while about 5 grammes of fresh faecal samples were also collected from the rectum of same animals into labelled universal glass bottles and filled to the brim to exclude air as much as possible. Blood and faecal samples were placed in ice-packed containers for transportation and later placed in a refrigerator at 4 C. The breed of the various pigs was noted before the samples were collected. In all, a total of 154 pigs were sampled and laboratory examinations were carried out within 24 hours of sampling.

Laboratory examinations

The blood samples were screened for the presence of blood parasites, that is, *Trypanosoma* spp., *Babesia* spp. and *Eperythrozoon* spp. as described by Urquhart *et al.* (1996) while the PCV, RBC and WBC counts were determined within few hours of blood collection. The faecal samples were also examined for gastrointestinal nematode eggs in the laboratory within few hours of collection as previously described Talabi *et al.*, (2007) using the floatation technique and total

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helminth egg count were carried out for all the faecal samples using a McMaster slides previously described by Soulsby (1982).

Results

Parasites in pigs

Haemo protozoan parasites were not found in all the blood samples collected. Out of the 154 faecal samples examined, 56 (36.36%) were positive for the presence of helminth parasites. The eggs of helminth parasites found were those of *Ascaris* spp., *Metastrongylus* spp., *Globocephallus* spp., *Oesophagostomum* spp., *Paragonimus* spp., *Hyostrongylus* spp. and *Trichuris* spp.

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The effect of helminthosis on the mean values of PCV, RBC and WBC of pigs is presented in Tables 1, 2 and 3, respectively. The mean PCV, RBC and WBC values of

pigs negative for helminth parasites were $31.66 \pm 8.30\%$, $10.57 \pm 4.68 \times 10^9/\text{ml}$ and $16.97 \pm 7.82 \times 10^6/\text{ml}$ respectively while the values for positive pigs were $29.71 \pm 8.93\%$, $9.81 \pm 4.84 \times 10^9/\text{ml}$ and $17.34 \pm 7.24 \times 10^6/\text{ml}$ respectively. Helminthosis caused a decline in the mean values of PCV and RBC count irrespective of the breeds. The percentage decline in mean PCV values was 6.13%, 8.43% and 1.64% respectively for large white, large white crossed and local breeds of pigs. The percentage decline in mean RBC values was 6.97%, 8.74% and 3.01% respectively for large white, large white crossed and local breeds of pigs. Helminthosis caused an increase in the mean WBC values in the three breeds which was 2.69%, 1.22% and 0.91% respectively for large white, large white crossed and local breeds of pigs.

Table 1: Effect of helminthosis on mean packed cell volume of pigs

Breed of pigs	Negative		Positive		Percentage decline
	Number	Mean PCV \pm sd (%)	Number	Mean PCV \pm sd (%)	
Large white	73	32.16 \pm 8.94	42	30.19 \pm 9.03	6.13%
Large white crossed	16	30.36 \pm 5.39	10	27.80 \pm 8.79	8.43%
Local breeds	9	29.89 \pm 6.91	4	29.40 \pm 9.10	1.64%
Total	98	31.66 \pm 8.30	56	29.71 \pm 8.93	6.16%

Table 2: Effect of helminthosis on mean Red Blood Cell (RBC) count of pigs

Breed of pigs	Negative		Positive		Percentage decline
	Number	Mean RBC \pm sd ($\times 10^9/\text{ml}$)	Number	Mean RBC \pm sd ($\times 10^9/\text{ml}$)	
Large white	73	10.33 \pm 8.86	42	9.61 \pm 4.35	6.97%
Large white crossed	16	10.87 \pm 6.15	10	9.92 \pm 8.82	8.74%
Local breeds	9	11.97 \pm 6.47	4	11.61 \pm 4.07	3.01%
Total	98	10.57 \pm 4.68	56	9.81 \pm 4.84	7.19%

Table 3: Effect of helminthosis on mean White Blood Cell (WBC) count of pigs

Breed of pigs	Negative		Positive		Percentage increase
	Number	Mean WBC \pm sd ($\times 10^6/\text{ml}$)	Number	Mean WBC \pm sd ($\times 10^6/\text{ml}$)	
Large white	73	16.33 \pm 7.62	42	16.77 \pm 6.99	2.69%
Large white crossed	16	18.88 \pm 8.89	10	19.11 \pm 8.18	1.22%
Local breeds	9	18.75 \pm 7.83	4	18.92 \pm 7.47	0.91%
Total	98	16.97 \pm 7.82	56	17.34 \pm 7.24	2.18%

Discussion

Parasitism is a major constraint to livestock productivity in Nigeria, hence its prevalence and control is very important. In this study, no haemo protozoan parasites were found in all the blood samples collected. Ademola and Onyiche (2013) examined 142 pig blood samples in the same area and found 5 pigs infected with *Trypanosoma simiae* and 2 pigs infected with *Trypanosoma brucei*. In another study, (Talabi *et al.*, 2010) examined 137 sick pigs in Ogun State and found 3.65% to be infected with *Trypanosoma brucei*. Usip (2014) also examined 172 slaughtered pigs in Uyo, Akwa Ibom State and found 45.93% to be infected with various haemoparasites. Pam *et al.*, (2013) examined 171 pigs for haemo parasites in some parts of Plateau State of which 36.84% pigs were positive and *Babesia spp.* and *Eperythrozoon spp.* were found. The absence of haemoparasites in the present study may be due to the regular use of chemoprophylaxis and acaricides by small scale farmer. However, the regular use of drugs and acaricides might lead to development of drug resistance as well as presence of drug residue in meat if withdrawal period is not observed before slaughtering (Ademola and Onyiche, 2013). In this study, 36.36% of the faecal samples were positive for eggs of helminth parasites which included *Ascaris spp.*, *Metastrongylus spp.*, *Globocephallus spp.*, *Oesophagostomum spp.*, *Paragonimus spp.*, *Hyostromylus spp.* and *Trichuris spp.* Talabi *et al.* (2010) found the following gastrointestinal nematode eggs in the faecal samples evaluated: *Ascaris sp.* (45.26%), *Strongyles* (10.22%), *Strongyloides spp.* (5.11%) and *Trichuris spp.* (2.92%). Pam *et al.* (2013) examined 171 pigs for gastrointestinal parasites in some parts of Plateau State of which 35.09% pigs were positive and parasites found include

Oesophagostomum dentatum, *Hyostromylus rubidus*, *Ascaris suum*, *Paragonimus westermanni*, *Metastrongylus spp.* and *Necator spp.* The high incidence of helminth parasites in the tropics may be as a result of the favourable environmental conditions that promote the survival and proliferation of the helminths and these helminths are able to complete their life cycles in-doors under the intensive system of management (Talabi *et al.*, 2010). Helminthosis caused a decline in the mean values of PCV and RBC values which is anaemia in all the breeds of pigs. This may suggest that the helminth infection could be the cause of anaemia encountered in this study. The anaemia is as a result of blood loss typical of helminthosis. (Adejinmi *et al.*, 2004) reported anaemia as a reliable indicator of severity of parasitic infection. In this study, helminthosis may be associated with the reduction in the mean PCV and RBC in infected pigs. The mean WBC count increased following helminthosis. The increase may be as a result of eosinophilia which is associated with parasitic infection.

Conclusion

The study showed that helminthosis caused a decline in the mean values of packed cell volume and red blood cell count values resulting in anaemia in all breeds of pigs while the mean white blood cell count increased. However, experimental infections of various breeds of pigs of different ages by various types of parasites need to be carried out in order to confirm the trend observed in this study.

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