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Prevalence of ecto and haemoparasites of pigs slaughtered in southern part of Gombe state, Nigeria

A Mohammed[1]*, FI Gimba[1], BB Ijoh[1], EE Baka[1], CM Alfred[1], SM Tukur[1], EA Malgwi[1] & G Bilbonga[2]

1. *Department of Veterinary Parasitology and Entomology, Faculty of Veterinary Medicine University of Maiduguri, Borno State, Nigeria*
2. *Department of Animal Production and Health, Federal University Wukari, Taraba State, Nigeria*

*Correspondence: Tel.: +2348032097911; E-mail: alimohvet@unimaid.edu.ng

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Abstract

A prospective sampling study was conducted to determine the prevalence of the major ecto-and haemoparasites of slaughtered pigs between October 2021 and April 2022 in southern parts of Gombe State Northeastern part of Nigeria. The study was limited to the southern part of the State which included: Balanga, Billiri, Kaltungo and Shongom Local Government Areas. Ectoparasites were collected from slaughtered pigs from different locations using brush and manual hand picking with forceps. The picked parasites were identified using a stereotype microscope. Out of the 87 pigs sampled, 31 (35.6%) were infested with ectoparasites, of which 29 (33.3%) were infested with *Haematopinus suis*, while 7 (8%) were hard ticks (*Hyalomma*, *Amblyomma* and *Rhipicephalus* spp.). Examination of stained blood smears showed the presence of haemoparasites in the sampled pigs from three Local Government Areas. However, this was different for Kaltungo Local Government where no haemoparasites were observed. Eperythrozoon specie was reported in Shongom and Balanga while mixed infections of Eperythrozoon and Babesia were observed in Billiri Local Government Area. The study established the presence of ecto-and haemoparasites in the Southern part of Gombe State.

Keywords: Ectoparasites, Haemoparasites, Pigs, Prevalence, Gombe State

Introduction

The pig production system has a high potential to contribute significantly to a nation's gross economic growth in the provision of opportunities for income generation for small-scale pig farmers, especially in developing countries of the world, including Africa (Huynh *et al*., 2007; Geresu *et al*., 2015). Nigeria is one of the leading African countries with significant pig population density (Robinson *et al*., 2014). Nigeria has the second largest population of pigs in Africa, which accounts for approximately 4.45% of the total meat supply in the country (Ikani *et al*., 2001).

Parasites pose a significant threat to animal production and swine is not an exception. Parasites affecting pigs cause major economic loss globally to the pig and pork industries and farming community as a consequence of reduced feed conversion, reduced weight gains and death (Boes *et al*., 2000). Disease outbreaks represent the major constraint to pig

production in locations where there is an absence of religious barriers to pork production and consumption (Igbokwe & Maduka, 2018).

Ectoparasites are organisms that live on the surface of bigger animals upon which they depend for food, shelter and other basic needs to survive (Rechav & Nuttall, 2000). It has been observed that ectoparasites do not only have direct effects on their host, they may also transmit pathogens, thereby acting as vectors of diseases (Parola & Raoult, 2001). These ectoparasites include fleas, ticks, mites and lice (Braae *et al*., 2011; Braae *et al.,* 2013; Kabululu *et al*., 2015). They pierced the skin surfaces of their hosts with their powerful biting and sucking mouth parts sucking the blood of their hosts and damaging their skin (Wilson *et al*., 2017). Pigs are of great economic importance; they are raised as livestock for meat (Saha *et al*., 2016). Unfortunately, these pigs which are of immense economic importance to man are attacked by ectoparasites (Braae *et al.,* 2011; Braae *et al*., 2013; Kabululu *et al.,* 2015).

Haemoparasites of pigs are endemic and prevalent within the tropics and subtropics (Levine, 1985). The most prevalent of blood parasites of pigs include *Trypanosoma* species, *Eperythrozoon parvum*, *Eperythrozoon suis*, *Babesia trautmanni*, *Babesia perroncitoi*, and *Anaplasma* species (Williamson, 1976 & Levine, 1985). Pigs become infected with haemoparasites due to the bite of blood-sucking arthropods such as tsetse flies, ticks, lice etc (Weng *et al*., 2005). *Eperythrozoon*, *Rickettsia*, *Theileria*, and *Babesia* species are transmitted by louse and ticks (Courgnaud *et al.,* 2001; Bell-Sakyi *et al.,* 2004). The development of parasites eminently depends on the suitable tropical environment (Clarke *et al*., 2005). Many works have been done as regards pigs in different areas and States in Nigeria but there is a paucity of information on the prevalence and public health significance of ecto and haemoparasites of pigs in the study area. This study is intended to enlighten the public about the common ecto and haemoparasites and their public health significance in the study area.

Materials and Methods

Study area

Gombe State is one of the 36 States in Nigeria. Its headquarters is Gombe metropolis in the northeast of Nigeria. It shares borders with Yobe State to the north, Borno and Adamawa States to the east, Bauchi State to the west and Taraba State to the south. Its latitude is 10°16´60.00´´ N and its longitude 11°09´60.00´´ (Usman *et al*., 2008; Mailafia & Iliya, 2009; Lekko *et al.,* 2017). This work is narrowed to the southern region of the State which includes; Billiri, Kaltungo, Balanga, and Shongom Local Government Areas.

Study population

The study population includes apparently healthy domesticated pigs brought for slaughter at the pig abattoirs within the study area. In the study area, investigations revealed that the majority of the domesticated pigs were mainly reared under the extensive pig management system, while few were kept under the semi-intensive by some farmers. The age of pigs was determined using tooth eruption patterns as described by Haijun *et al*. (2004). For the purpose of convenience, the ages of pigs were categorized into two broad groups; which comprised pigs less than 16 weeks (considered as young pigs) and those above 16 weeks (adult pigs) as described by Keshaw *et al*. (2009).

Study designs and sample size determination

A prospective sample study design was used to determine the prevalence of ecto- and haemoparasites of slaughtered pigs in pig abattoirs from October 2021 to April 2022.

Collection of ectoparasite

Ecto-parasites were collected from pigs using brush and picking with forceps. The picked parasites were placed in universal sample bottles containing 10% formalin. The specimens were identified using a stereoscope microscope.

Collection of blood sample

Blood samples were collected from the jugular veins at the point of slaughter. About 2ml of blood was collected from each animal into bottles containing ethylenediamine tetra-acetic acid (EDTA) as an anticoagulant.

Preparation of thin blood film

A drop of blood was placed on one end of a grease-free glass slide. Another slide with a narrower edge was held at 45° to the drop of blood until the blood spread at its margin. The slide was steadily and rapidly moved backwards to make a thin film. The film was air-dried and fixed in absolute methanol for about 2 minutes, and stained with Giemsa stain for 40-60 minutes. The slide was washed under tap water, air-dried and examined under the oil immersion objective of the microscope for the presence of

haemoparasites as adopted by Cheesbrough *et al*. 2000), Bhatnagar *et al*. (2003).

Results

Out of the total 87 pigs sampled, 31 (35.6%) are infested with ectoparasites, of which 29 (33.3%) were infested with lice (*Haematopinus suis*) which are scattered all over the body while 7 (8%) were infested with ticks (*Hyalomma* spp., *Amblyomma* spp., *and Rhipicephalus* spp.) which predilected the penile and anal regions in males while in females it predilected the vaginal and anal regions. Only 5 (5.7%) had mixed infestations of ticks and lice. In relation to sex, there were 34 males and 53 females, of which 17(50%) of males were infested with lice while 12(22.6%) of females were infested with lice. 4(23.5%) of males were infested with ticks while 3(5.7%) were infested with ticks for females. The results of this study show that pigs from the study area were infested with lice; 3(60%), 5(45.5%), 6(42.9%) and 15(26.3%) in Kaltungo, Shongom, Billiri and Balanga respectively, whereas ticks were only observed in Billiri and Balanga 1(7.1%) and 6(10.5%) respectively.

Blood samples from Kaltungo did not show any haemoparasites, out of the 5 samples collected all were negative. Samples from Shongom, Billiri and Balanga were positive for *Eperythrozoon* spp. 1(9.1%), 1(7.1%) and 1(1.8%) out of 11, 14 and 57 samples collected respectively, however, 1(7.1%) mixed infection of *Eperythrozoon* spp. and *Babesia* spp. was observed in Billiri accordingly.

Table 1: Prevalence of ecto-parasites of domestic pigs in parts of Gombe State based on study location and sex

Study location	Number of pigs examined	Number of pigs infested				Prevalence (%)
		male	Prevalence (%)	Female	Prevalence (%)	
Kaltungo	5	2	40.0	1	20	60
Shongom	11	3	27.3	2	18.1	45.5
Billiri	14	5	35.7	1	7.1	42.9
Balanga	57	8	14.0	9	15.8	29.8
Total	87	18	20.7	13	14.9	35.6

Table 2: Prevalence of haemoparasites in the southern part of Gombe State, Nigeria

Study location	Number of pigs examined	Number of pigs infected		Prevalence (%)
		Eperythrozoon	*Babesia*	
Kaltungo	5	(−)	(−)	0
Shongom	11	+(1)	(−)	9.1
Billiri	14	++(2)	+(1)	21.4
Balanga	57	+(1)	(−)	1.8

Plate I: Photo of *Haematopinus suis* obtained from a pig in Gombe south, Nigeria. ×100

Plate II: Photo of *Hyalomma* species obtained from a pig in Gombe south, Nigeria. ×100

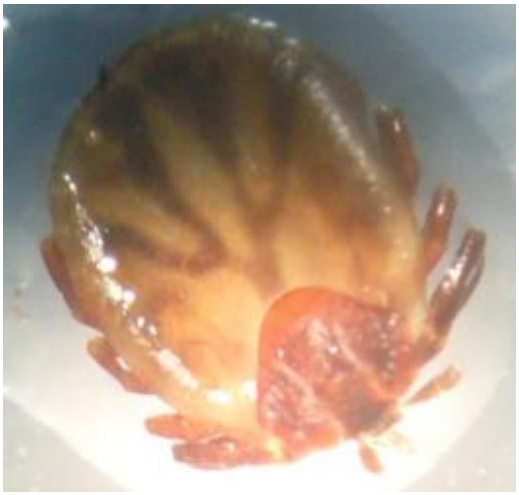

Plate III: Photo of the nymph of *Amblyomma* species isolated from a pig in Gombe south, Nigeria. X100

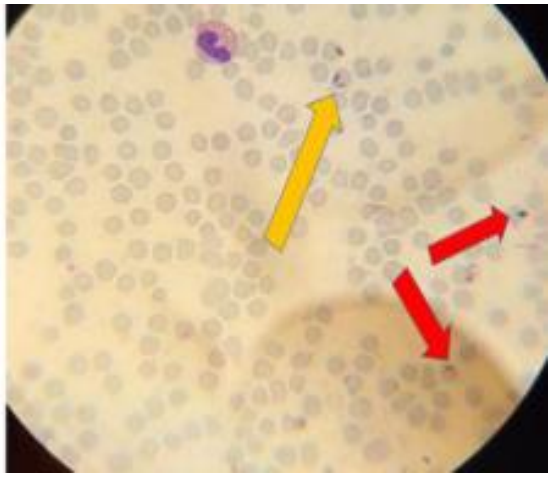

Plate IV: Photo showing mixed infection of *Eperythrozoon* species (red arrows) and *Babesia* species (yellow arrow) isolated from a pig in Gombe south, Nigeria. X1000

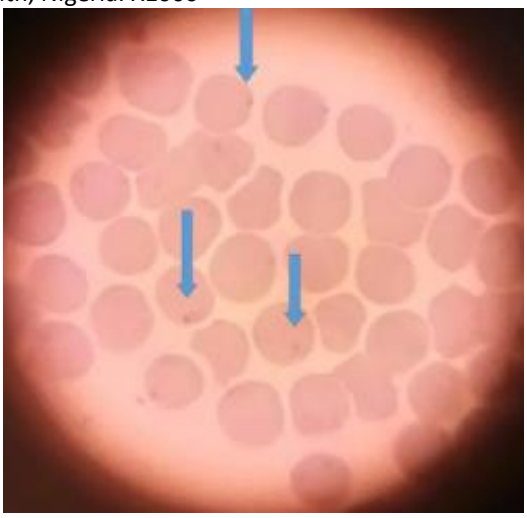

Plate V: Photo showing *Eperythrozoon* species isolated from a pig in Gombe south, Nigeria. X1000

Discussion

Parasitism is among the major constraints affecting pig production in Nigeria. This study revealed that the louse *Haematopinus suis*, and ticks (*Hyalomma* spp., *Ambylomma* spp., and *Rhipicephalus* spp.) were the ecto parasites infesting pigs within the study area with a prevalence of 35.6%. Similar study done by Ejinaka & Onyali (2020) gave a higher prevalence of 48.5%, with *Haematopinus suis* and *Sarcoptic scabiei* as the parasites infesting pigs in Enugu. Dipeolu *et al*. (1982) also reported that the sucking louse *Haematopinus suis* was the most prominent ectoparasite infesting pigs in Ibadan, other ecto-parasites of pigs identified in the study area (Ibadan) were *Amblyomma variegatum, Rhipicephalus sanguineus, Demodex* and *Sarcoptes* species and *Tunga penetrans*. Elom *et al.* (2021) reported a low prevalence of ectoparasites infesting pigs in Abakaliki and Izzi LGA of Ebonyi State with a prevalence of 26.1 %. Odo *et al.* (2016) reported a higher prevalence of 50.75 % among pigs in Emene town area in Enugu State with lice, mites, and flies as the ectoparasites infesting pigs. In relation to sex in this work, there was a higher infestation rate among males than in females, as reported by Elom *et al.* (2021) except in infestation with *Haemaphysalis* spp. where the females were infested more than the males. This agreed with Kagira *et al*. (2013) who reported that male pigs had the highest prevalence of *Haematopinus suis*.

In the present study, the prevalence of certain parasites was higher among males compared to females. This might be attributed to the sampling process, where the percentage of males sampled is higher than that of the females. This finding highlights the importance of considering the sampling methodology when interpreting data on parasite prevalence. David (1995) and Odo (2016) reported that prevalence by sex showed that the female pigs have a greater number of ectoparasites than the male pigs except in lice (*Haematopinus suis*), where the number collected from the male was slightly greater than the female. *Hyalomma* spp*., Amblyomma* spp., and *Rhipicephalus* spp. were the ticks that were found to predilect the penile and anal regions in males and the vaginal and anal regions in female pigs within the study area. *Haematopinus* spp. of lice was found to infest the pigs which was scattered all over the body

within the study area. It has been documented that *Rhipicephalus* spp. can transmit *Babesia trautmanni* (Chastain *et al*., 1968), *Haematopinus suis* can transmit *Eperythrozoon parvum* (Edwards & Seamer, 1960) which suggests the possibilities of the pigs within the study area to come down with the infection.

Eperythrozoon spp. and *Babesia* spp. were among the haemoparasites identified to infect pigs within the study area with a prevalence of 4.6%. Ejinaka & Onyali (2020) reported a mean prevalence of 20% with *Trypanosoma* species and *Eperythrozoon suis* as the haemoparasite affecting pigs in Enugu. Ademola & Onyiche (2013) also reported a low prevalence of *Trypanosoma* spp 4.9% among pigs slaughtered at Bodija abattoir, Ibadan. Gagman *et al.* (2014) reported 17.3% prevalence of *Trypanosoma*, *Eperythrozoon*, *Babesia*, and *Anaplasma* species from slaughtered pigs in Jos. Pam *et al*. (2013) reported a prevalence of 36.8% for *Trypanosoma* spp. and 9.9% for *Eperythrozoon suis*. The result differs from the work of Dipeolu *et al.* (1982) who reported a prevalence of 8.0% in Ibadan among local pigs. The low prevalence of haemoparasites among pigs may be due to high fats deposit in the subcutaneous tissue layer of the pigs which makes it difficult for the vectors of haemoparasites of pigs to penetrate through the skin in their biting and sucking mode of feeding as suggested by Gagman *et al* 2014. From our result, only one pig had mixed infections of *Eperythrozoon* and *Babesia* species. Pigs from Billiri, Shongom and Balanga were positive for haemoparasites infections. The prevalence obtained within the study area disagrees with the work of Dipeolu *et al.* (1982) and Odo *et al.* (2016) which may be due to the fact that pigs in the western and southern parts of Nigeria were more exposed to insect vectors than in the northern Nigeria. Also from 1981 to 2022, there has been a great improvement in veterinary medical care, which greatly reduces infection rates of haemoparasites. Amongst these pathogens transmitted to pigs *Babesia suis* causes Babesiosis in both piglets and adults, in the acute stage of the disease, there is fever, anaemia, jaundice, and oedema of the affected parts. Pregnant sows may abort and mortality may reach 50% (Soulsby, 1982).

In conclusion, the prevalence of ecto parasite affecting pigs in Gombe South shows that *Hyalomma* spp., *Amblyomma* spp., and *Rhipicephalus* spp. are the ticks found to infest pigs within the study area which predilects the penile and anal regions in males and vaginal and anal regions in female pigs within the study area. *Haematopinus suis* was found to infest pigs and they coexist as mixed infestation with ticks. Moreover, *Eperythrozoon* spp. and *Babesia* spp. were found to infect pigs within the study area but with low prevalence. Our study recorded a lower prevalence of haemoparasites infections in pigs as compared to previous studies elsewhere.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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