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Farm system distribution of gastrointestinal and haemoparasites of pigs within Makurdi metropolis

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Abstract

Parasitic diseases remain a major constraint to pig production, causing high morbidity and mortality rates, reduction in feed conversion ratio and weight gain, as well as compromising the reproductive performance of infected animals. The prevalence of parasites is considerably influenced by the type of husbandry system practiced. This study was carried out to determine the prevalence and comparison of gastrointestinal and haemoparasites of pigs reared within Makurdi metropolis under intensive and extensive management systems. A total of 209 blood and 209 faecal samples were collected from both intensive and extensively reared pigs of different breeds and analyzed. Thin blood smear technique was used for haemoparasites screening while simple flotation and sedimentation techniques were applied for faecal analysis, after which the data were subjected to descriptive and inferential statistics for prevalence determination. Five different gastrointestinal parasites, namely Strongyles, *Trichuris suis*, *Taenia solium*, *Balantidium coli* and *Isospora* species, and three haemoparasites, namely *Babesia* species, *Anaplasma* spp and *Eperythrozoon suis* were observed; with Strongyles and *Babesia* species seen as the most prevalent parasites in the study area. The gastrointestinal and haemoparasites prevalences were higher in extensively reared pigs (93.33% and 48% respectively) compared to 53.73% and 33.58% respectively in intensive system. The study has established the prevalence of certain gastrointestinal and haemoparasite species, and the effect of management system on the prevalence of these parasites within Makurdi metropolis. The extensive system of management has been seen to favour the prevalence of the parasites.

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Introduction

Pigs are one of the most domesticated omnivorous animals found throughout the tropical and temperate regions of the world. There are over 90 recognized breeds of pigs and an estimated 230 species in the world (Long, 2003; Masterson, 2007). Generally, the rearing systems commonly practiced in Nigeria include extensive, semi-intensive and intensive systems. The relevance of the pig enterprise to the Nigerian economy cannot be overemphasized. For example, the most recent

estimated pig population of Nigeria as reported by the National Agricultural Sample Survey (2011) was 7.1 million pigs, with Benue contributing more than 20% of the total country's production (Umeh *et al*., 2015).

Pig production in Benue State is mainly controlled by smallholder rural farmers who practice the extensive (traditional) system of management with inadequate supplemental feeding and veterinary care, hence the practice is plagued by a myriad of constraints such as susceptibility to parasites and diseases, poor management, religious, social and cultural constraints, high cost of inputs, inadequate capital inputs, expensive feeds as a result of erratic supply of grains, lack of quality breeding stock, poor and unorganized marketing; expensive veterinary drugs and uncontrolled pig movement; *et cetera* (Ogunniyi & Omoteso, 2011; Muhanguzi *et al*., 2012).

Parasitic diseases are a limiting factor against the general performance of pigs and consequently pig production. This is because of their ability to cause high morbidity and mortality, reduce feed conversion and weight gain, and compromise the reproductive performance of pigs as well as efficient and profitable pig production (Lekule & Kyvsgaard, 2003; Nissen *et al*., 2011). With more than 20 % of the country's pig production coming from Benue State (Umeh *et al*., 2015) and considering the great limitation imposed by parasitic diseases on the development of the piggery enterprise and to the State's economy at large, this study was therefore imperative.

The study therefore sought to provide and compare information on the effect of systems of management on the prevalence of gastrointestinal and haemoparasite species of pigs.

Materials and Methods

Study area

The study was conducted from August, 2016 to March, 2017 in Makurdi Metropolis. Makurdi, the capital of Benue State is located in north central Nigeria. The town lies on latitude 7° 44' 0" N and longitude (8° 32'0"E) and has a Guinea savannah type of vegetation, with a population of about 4, 253,641 people (NBS, 2010).

Sample size

A total number of 209 faecal and 209 blood samples was collected from farms randomly selected. Out of these samples, 134 were from intensively reared pigs while 75 were from pigs reared extensively.

Sample collection and techniques

Feacal and blood samples were collected

1. Fresh faecal samples were randomly collected per rectum between 8:00am and 12:00 noon using polythene hand gloves, as described by WHO, (2003). Each sample was appropriately labeled, transported on ice to the Parasitology Laboratory of the Veterinary Teaching Hospital, University of Agriculture, Makurdi (UAM) and preserved in refrigerator until microscopic examination was carried out, usually within 48 hours.
2. Blood samples were collected into capillary tubes using the ear pricking method as previously described by Pam *et al*. (2013). Thin blood films were prepared by a drop of blood from the capillary tube placed on the surface of a pre-cleaned grease free microscope slide and air dried. The thin smears were fixed with absolute methanol and stained with Geimsa stain, then microscopically examined for haemoparasites under oil immersion using high (x100) magnification (Gupta & Singla, 2012).

Sample Examination and techniques

Faecal examination**:** the first method used is the simple test tube flotation; 1g of each faecal sample was emulsified in 20 mL of saturated sodium chloride solution in a beaker. It was then sieved into a centrifuge tube using a tea strainer until a convex meniscus was formed. The tube was then carefully covered with a clean, grease-free cover slip and allowed to stand for 5 minutes, after which the cover slip was carefully removed and placed on a clean grease-free microscope slide. The slide was then viewed under a microscope at ×10 magnification and the results were recorded immediately.

The second method was Sedimentation Technique; 2g of each faecal sample was emulsified in 20 mL of clean tap water in a beaker. 10 mL of it was then sieved into a centrifuge test tube using a tea strainer. The tubes were then loaded symmetrically into the centrifuge machine to ensure balance and centrifuged at 1,500 rpm for 2 minutes to obtain supernatant and sediment, the process was repeated until a clear supernatant was formed. The supernatant was then decanted and two drops of the sediment were placed on a clean, grease-free microscope slide. A cover slip was then carefully placed and the slide and was viewed under the microscope at ×10 magnifications and confirmed with × 40 magnifications (Gupta & Singla 2012).

Data analysis

The data obtained from the study were subjected to descriptive and inferential statistics for prevalence determination in percentages, which were then represented diagrammatically with the aid of histograms.

Results

Five different types of gastrointestinal parasite eggs, consisting of two genera of nematodes (Strongyle and *Trichuris suis*), one genus of cestode (*Taenia solium*) and 2 genera of protozoa (*Balantidium coli* and *Isospora* species), were identified. Few un-identified gastrointestinal parasitic eggs and mixed infections were also recorded. In addition, 3 genera of haemoparasites were seen to be prevalent in this study, namely *Babesia* species, *Anaplasma* species and *Eperythrozoon suis*. Some mixed infections within the haemoparasites were also recorded.

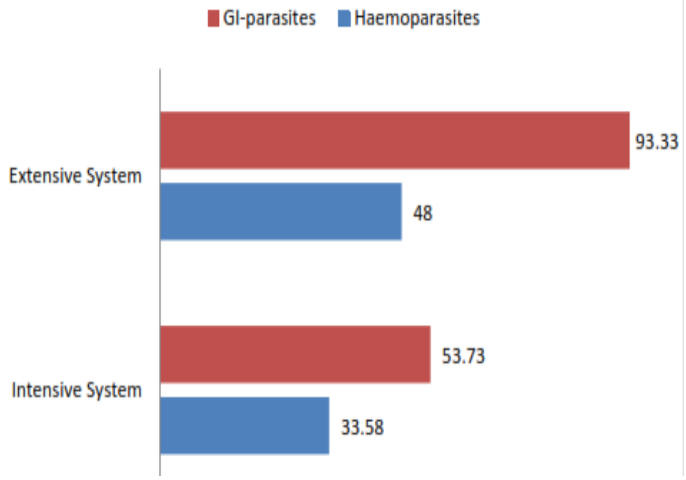

Figure 1: Overall prevalence of gastrointestinal parasites and haemoparasites of pigs within Makurdi metropolis in intensive and extensive management systems

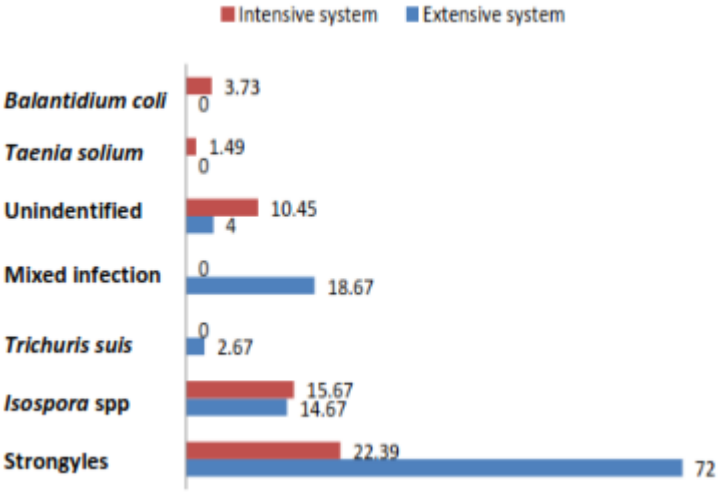

Figure 2: Prevalence of various species of gastrointestinal parasites of pigs within Makurdi metropolis under intensive and extensive management systems

The prevalence of gastrointestinal parasites was higher in extensive system with 70 (93.33%) positive out of the 75 pigs sampled as compared to 72 (53.73%) positive out of the 134 pigs sampled in the intensive system. The prevalence of haemoparasites was higher in extensive system with 36 (48.00%) positive out of the 75 pigs sampled, compared with 45 (33.58%) positive out of the 134 intensively reared pigs sampled (Figure 1).

Strongyles had the higher prevalence in extensive system as 54 (72.00%), followed by *Isospora* species and *Trichuris suis* with prevalence of 11 (14.67%) and 2 (2.67%) respectively. In the intensive system however, some additional parasites such as *Taenia solium* and *Balantidium coli* were seen, with *Strongyle* species recording a prevalence of 30 (22.39%), followed by *Isospora* species 21 (15.67%), while *Taenia solium* and *Balantidium coli* recorded low prevalence of 2 (1.49%) and 5 (3.73%) respectively. Mixed infections were only seen in the extensive system with a prevalence of 14 (18.67%). The prevalence of unidentified parasite ova was higher more in the intensive system as 14 (10.45%) compared to 3 (4.00%) in extensive system (Figure 2).

The haemoparasites, *Babesia* species had the highest prevalence of 20 (26.67%), followed by *Anaplasma* species with 11 (14.67%) and *Eperythrozoon suis* 5 (6.67%) respectively in the extensive system. Though the same order was maintained in the intensive system, *Babesia* species, *Anaplasma* species and *Eperythrozoon suis* had prevalence of 23 (17.16%), 20 (14.93%) and 2 (1.49%) respectively. Mixed infections were also seen only in the extensive system with prevalence of 8.00% (Figure 3).

Discussion

It is generally thought that the prevalence of parasites is considerably influenced by the type of husbandry system practiced (Wabacha *et al*., 2001). This study was therefore carried out to determine the impact of management system on the prevalence of gastrointestinal parasites and haemoparasites of pigs within Makurdi

metropolis.

This study observed that the percentage prevalence of gastrointestinal parasites was relatively higher in the extensive management system (93.33%), compared to 53.73% prevalence under intensive management. Authors like Ajayi *et al*. (1988), Boes *et al*. (2000), Tamboura *et al*. (2006) and Nwoha and Ekwurike, (2011) reported similar high prevalences of 97%, 95.9%, 91% and 100% respectively in their works on outdoor pigs. The high prevalence in extensive management system could be attributed to the fact that non-housed pigs (scavengers) are in constant contact with highly contaminated soil, pasture and contaminated water because of their routine behaviour, which increases their uptake of infective stages as well as intermediate hosts of the parasites; hence the increased worm burdens. However, prevalence of specific gastrointestinal parasites varies with type of management system. For example, Strongyles had higher percentage prevalence of 72% in extensive management system while *Trichuris suis* recorded lower prevalence of 2.67% also in extensive management. The low percentage prevalence is comparable to the result of Wosu (2015) and Karaye *et al*. (2016) and they attributed their findings to the higher mortality of *Trichuris suis* eggs under field conditions; however, higher prevalence of 51.3% was reported by Ajayi *et al*. (1988). This variability in the percentage prevalence of *Trichuris suis* could be explained by the effect of environmental conditions on the development of both its eggs and earthworms which serve as transport hosts. This is because, both the eggs and transport host are highly susceptible to dehydration and high temperature, and thus are easily killed in dry environments.

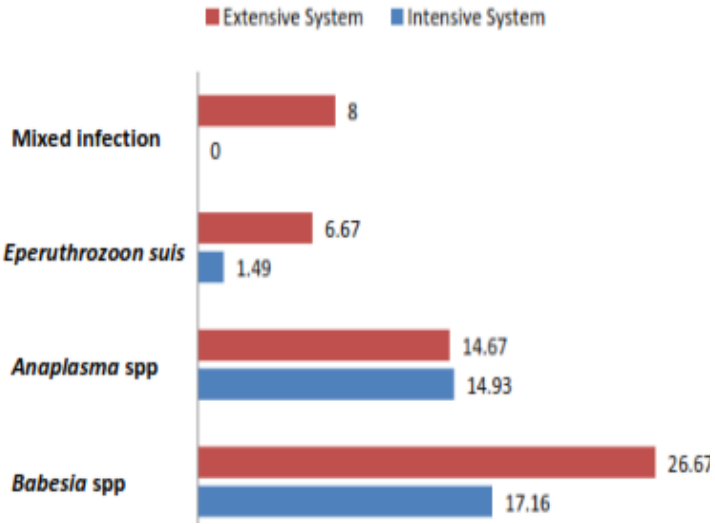

Figure 3: Prevalence of various species of haemoparasites of pigs within Makurdi metropolis under intensive and extensive managements

Another gastrointestinal parasite with low prevalence of 1.29% was *Taenia solium*, which was recorded only in the intensive system; this incidence could be due to the supply of water or feed contaminated with human faeces, resulting in infection of the pigs with the parasite. This situation is common in places where faeces deposited into the open environment are often washed into uncovered wells and other water sources, thereby contaminating the water and making it a source of infection for both pigs and humans (Murrell *et al*., 2005). On the contrary, the two protozoan gastrointestinal parasites (*Balantidium coli* and *Isospora* species) observed in this study had higher percentage prevalence of 3.73% and 15.67% respectively in the intensive management system. This is explained by the fact that high prevalence of *Isospora* occurs universally, most commonly in animals confined or housed in small areas contaminated with oocysts (Taylor *et al*., 2007; Pam *et al*., 2013). The incidence of gastrointestinal parasites mixed infections, however, had higher percentage prevalence (32.11%) in the extensive system of management, and this could also be attributed to constant exposure of pigs to highly infected pasture lands and contaminated water as they roam and scavenge (Pittman *et al*., 2010).

In the area of the effect of management system on haemoparasites prevalence, an overview in this present study revealed that, the percentage prevalence of haemoparasites was higher in pigs reared under the extensive (traditional) management system (48.00%) compared to 33.58% in those under intensive management system. The result is similar to those of Eyo *et al.* (2014) and Usip (2014) who reported percentage prevalence of 42.77% and 45.93%, respectively. This finding could be due to favourable environmental conditions in the outdoor system such as, the presence of shrubs and tall grasses, as well as moisture, which enhance the proliferation and host-finding activities (questing) of arthropod vectors responsible for transmission of the blood parasites as well as lack of Veterinary care and irregular use of chemoprophylaxis by peasant pig farmers. In addition, the report of much higher percentage prevalence of haemoparasites by Dipeolu *et al*.

(1982) and Opara *et al*. (2005) in the extensive management system further supports the finding that this system of management favours the prevalence of haemoparasites.

But a closer observation on the response of specific haemoparasites to different types of management systems in this present study revealed that there are variations. For example, while both *Babesia* species and *Eperythrozoon suis* had higher percentage prevalences of 26.67% and 6.67% respectively in the extensive management system, *Anaplasma* species on the other hand was shown to have a higher percentage of 14.93% in the intensive management system. The higher prevalence of both *Babesia* specie and *Eperythrozoon suis* in the outdoor system could be attributed to the suitable environmental conditions that enhance the proliferation of ticks and lice (which are the arthropod vectors of most haemoparasites of pigs). This agrees with the report of Abdu & Gashaw (2010) that free range husbandry coupled with poor environmental hygiene are the major risk factors to infection of pigs with parasites. Conversely, the higher prevalence of *Anaplasma* species in the intensive management system could be attributed to poor husbandry practices such as overcrowding, poor pen and environmental hygiene, failure to quarantine and thoroughly screen new stock for both ectoparasites and haemoparasites before introducing them into the herd, *et cetera*, which in turn facilitate transmission of blood parasites.

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