**Original Research Article**

**A SURVEY OF ECTOPARASITES INFESTATION OF PIGS IN AWKA, ANAMBRA STATE,** **NIGERIA**

**ABSTRACT**

Ectoparasite infestation is a major problem faced by pig farmers which is often associated with a huge economic loss and decreased yield in production. This cross-sectional study was undertaken to survey ectoparasites present in three selected farms in Awka, Anambra State, and their prevalence in relation to sex, age and location. A total of 101 pigs were examined for the presence of ectoparasites using standard parasitological methods. A total of 69 pigs were infested with an overall prevalence of 68.32%. The ectoparasites seen on the pigs included; lice (*Haematopinus suis* 37.68%), mites (*Sarcoptes scabiei* 34.78%) and ticks (*Rhipicephalus species* 11.59%, *Amblyomma* species 13.04%, and *Haemaphysalis* *longicornis* 2.91%). The female pigs had the highest level of ectoparasites infestation (69.39%) while the male pigs had a slightly lower infestation rate 67.3%, although the result was not statistically significant (*p*=0.917). Pigs within the age range of 6-19 months recorded the highest infestation of ectoparasites (67.92%), while those between the age ranges of 1-5 months and >20 months had 66.66% parasite infestation respectively. There was no significant difference in the level of infestation across the different ages of the pigs examined (*p*=0.706). The infestation of pigs by ectoparasites in the study area was found to be high and this calls for the implementation of regular control strategies and better management practices of pig farms.

**Keywords:** Awka, Ectoparasites, Intensive rearing, Pigs, Survey,

1. **INTRODUCTION**

Livestock farming is one of the most important components of the agricultural sector in Nigeria and beyond. Animal rearing particularly pig production is on the rise in most countries including Nigeria due to its income-generating potentials (Toure et al. 2024). Estimates associate Nigeria with the 2nd largest pig population in Africa which represents about 4.45% of the total meat available in the country (Mohammed et al. 2024). Swine breeds can be found throughout tropical and temperate regions especially in areas where religious and cultural beliefs pose no restraint (Igbokwe and Maduka 2018). The crucial role played by pigs in the meat industry cannot be over-emphasied as it contributes greatly to national development through the provision of high-quality animal protein for human consumption, poverty reduction, employment opportunities, contribution to GDP and overall economic upliftment (Geresu et al. 2015). The pig’s has high fecundity and feed conversion efficiency, good quality meat, relatively small space requirement, efficient adaptation to different habitats and management conditions, early maturity and short generation cycle are some of the merits of pig farming compared to other livestock (Jufare et al. 2015). Pigs are reared under intensive, semi-intensive and free-range systems, all of which present various advantages and disadvantages. There are many factors limiting pig production in Nigeria, the most important being parasitic disease pathogens such as ectoparasites. Parasitic diseases are a huge challenge limiting pig production in Awka with associated high levels of morbidity and mortality. The effects of these parasitic infestations range from reduced litter size, growth rate, amnesia, premature slaughter and rejection of carcasses during meat inspection (Odo et al. 2016).

Numerous ectoparasites comprising lice, mites, ticks and fleas have been implicated as ectoparasitic agents in pigs, particularly in regions with poor sanitary conditions and where free-range rearing is practised (Elom et al. 2021). The activity of ectoparasites infesting livestock and companion animal hosts is of particular interest because it results in a wide range of pathogenic effects. Research conducted in different parts of the world has attributed ectoparasites of pigs such as ticks, mites and lice with the transmission of rickettsial, viral and protozoan pathogens to host animals (Liu and Bonnet 2014). Infestation by ectoparasites causes discomfort due to itching and irritation in host animals which may result in irregular feeding, weight loss and moderate to severe blood loss (Islam et al. 2022). Ectoparasites such as lice are reported to be vectors of diseases such as eperythrozoonosis, swine pox and African Swine Fever (Kagira et al., 2013), while others such as ticks are implicated in the transmission of various disease conditions such as tularemia, heartwater, African swan fever virus, theileriosis, anaplasmosis and babesiosis also known as tick fever (Avenant et al., 2021). The zoonotic nature of some of these diseases such as tularemia means they can be equally transmitted to humans (Egan et al., 2021; Marx et al., 2024). In the environment, Leptospirosis which is a bacterial infection can equally be transmitted to humans while pigs reported function as accidental or mantainance hosts (dos Santos et al., 2023). On the other hand, infestation by *S. scabiei*, a mite responsible for scabies or mange, triggers allergic reactions, inflammation, disrupt balance between Th1, Th2, host physiological functions, as well as interfer with the antioxidant defense system in mammalian hosts (Kumar De et al., 2020). In endemic settings, the basic concepts of biosecurity which include cleaning, disinfection and segregation must be implemented to minimise the risk of parasitic disease transmission. Unfortunately, these measures are grossly inadequate especially in under developed regions globally (Kouam et al. 2019). The increasing rate of pork consumption in Awka metropolis and southeast in general poses significant threat to public health due to its potential to act as intermediate host of disease-causing pathogens (Odo et al. 2016; Okoli et al. 2002). There is no doubt that pig farming in Nigeria is greatly affected by the persistence of diseases especially those caused by ectoparasites, the impact of which remains under-assessed (Toure et al. 2024). Even when they are not the direct cause of mortality in swine, these ectoparasites give rise to sub-clinical parasitism that can severely influence animal rearing and productivity (Tassou 2009). Currently, there is a paucity of data regarding ecto parasitism in swine and associated risk factors in southeastern Nigeria, particularly Anambra State. Therefore, this study was carried out to survey the prevalence of ectoparasites on pigs in Awka, Anambra State, Nigeria.

1. **MATERIALS AND METHODS**

**2.1 Study area**

The study was conducted in 3 different farm locations within Awka, Anambra State. Awka is the capital of Anambra State and with a population of 371,038 inhabitants according to the 2006 Nigerian population census. Awka is located in the southeast region of Nigeria and the area is characterized by 8 months of rainfall usually from March to October and 4 months of dryness from November to February yearly. The town experiences varying temperature ranges from 27°C to 30°C between June and December and 32°C to 34°C between January annually (Nwadike et al. 2023). The first study site is Okeb farms which is located in Amawbia. Amawbia is situated in Awka south Local Government Area of the state. It is about 10km South of Awka. The second location is Ejighiato Agro farm which is located at Ring Road Junction Awka. The third farm is Obiekezie farm also located at ring road junction Awka. These study sites were selected based on the availability of large number of pigs they housed.

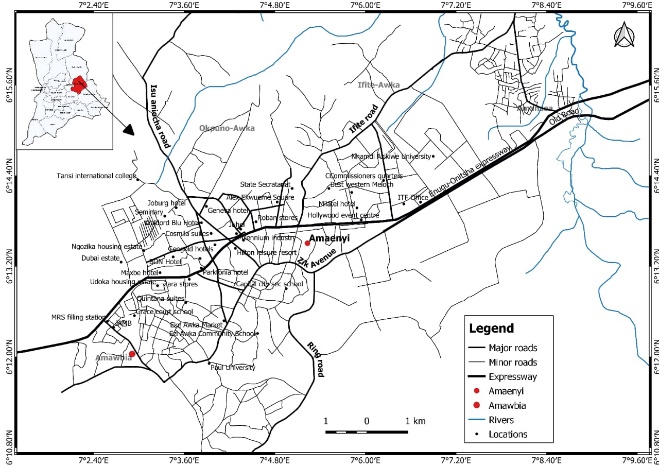


Figure 1: Map of Awka metropolis showing study areas

**2.2 Study Population**

The study population comprised of all pigs that were currently been reared in the three farms sampled for this study. The pig farm selection was based on the consent of the farm managers.

**2.3 Study Design**

The study adopted a cross sectional design. It was conducted between July and August 2024 to determine the prevalence of the ectoparasites found in pigs in the study locations.

**2.4 Sample Size**

A total of 101 pigs randomly selected from three different farms in Awka was used for this study. The age, sex and location of each screened pig was also documented.

**2.5 Sample Collection**

The samples were collected directly from the body of the pigs by using a brush to detach the ecto parasites into an A4 paper. The samples were transferred into their respective sampling containers. For mites, a sterile scalpel blade dipped in mineral oil was used to scrape the skin at margins of lesions and other suspected portions on the animal’s body. The scrapings were suspended on a microscope slide containing a drop of mineral oil for microscopic examination. The collected samples stored using 70% alcohol in labeled specimen bottles. For each sample, the age and sex of the pig, farm location and specimen number were recorded appropriately. A total of 24 weekly research visits, once every week in each farm, for sample collection was carried out for a period of two months.

**2.6 Statistical Analysis**

All data collected was entered into Microsoft Excel and exported to SPSS version 20 for analysis. The data was analyzed using descriptive and inferential statistics. Descriptive statistics was used to analyze overall prevalence and species prevalence. Difference in parasite infection prevalence in relation to sex was determined using Chi-square (χ2) test and *P* ≤ 0.05 was considered significant.

1. **RESULTS**

Out of the 101 pigs sampled from 3 different locations,5 species of ectoparasites from 2 orders and 3 families were seen namely; Lice (*Haematopinus suis*)*,* mites(*Sarcoptes scabiei*) *and* ticks(*Amblyomma* species*, Rhiphicephalus* speciesand *Haematopinus longicornis*).

Table 1: Abundance of ectoparasites recovered from sampled pigs

|  |  |  |
| --- | --- | --- |
| Species | Occurrence | Abundance (%) |
| *Haematopinus suis* | 26 | 37.68 |
| *Sarcoptes scabiei* | 24 | 34.78 |
| *Amblyomma sp* | 9 | 13.04 |
| *Rhiphicephalus sp* | 8 | 11.59 |
| *Haematopinus longicornis* | 2 | 2.91 |
| Total | 69 | 100 |
| χ2=32.522 | df=4 | p=0.000 |

The overall prevalence of ectoparasites in the total population was found to be 68.31%. Pigs sampled from Obiekezie farms recorded the highest prevalence of ectoparasites infestation (80.00%), followed by Okeb farms (70.90%) while the least infested pigs where from Ejighiato Agro farms (53.00%).

**Table 2: Prevalence of ectoparasite infestation in relation to location**

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Number examined | Number infected | Prevalence |
| Okeb farms | 55 | 39 | 70.91 % |
| Ejighiato Agro farms | 26 | 14 | 53.85% |
| Obiekezie farms | 20 | 16 | 80.00% |
| Total | 101 | 69 | 68.32% |
| χ2=3.947 | df=2 | p=0.139 |  |

Age-wise prevalence revealed that pigs within the age range of 6-19 months (grower) were the most infested (67.92%), while pigs within the age of 1-5 months (piglet) and those above 20 months recorded the same prevalence (66.66%).

**Table 3: Prevalence of ectoparasites in relation to age of the pigs.**

|  |  |  |  |
| --- | --- | --- | --- |
| Age (months) | Number examined | Number infected | Prevalence (%) |
| 1-5 (Piglet) | 33 | 22 | 66.67 |
| 6-19 (Grower) | 53 | 37 | 69.81 |
| Above 20 | 15 | 10 | 66.67 |
| Total | 101 | 69 | 68.32 |
| χ2=0.115 | df=2 | p=0.944 |  |

The female pigs (sows) had the most ectoparasite infestation (69.38%) while the male pigs (boars) recorded a slightly lower rate of ectoparasite infestation (67.30%). The result showed that infestation by ectoparasites was not dependent on the sex of the pigs (*p* > 0.05).

**Table 4: Prevalence of ectoparasites in relation to sex of pig**

|  |  |  |  |
| --- | --- | --- | --- |
| Sex | Number examined | Number infected | Prevalence (%) |
| Female (Sow) | 49 | 34 | 69.39 |
| Male (Boar) | 52 | 35 | 67.31 |
| Total | 101 | 69 | 68.32 |
| χ2= 0.050 | df=1 | p=0.822 |  |

1. **DISCUSSION**

The result from the survey has shown a high prevalence of various ectoparasite species infestations in pigs kept in a confined system in Awka, Anambra State. The overall infestation prevalence of 68.32% recorded in this study is higher than the 26.1% and 50.75% reported by Elom et al. (2021) and Odo et al. (2016) in Enugu and Ebonyi States respectively. Elsewhere in Africa, Mhoma et al. (2012) had earlier documented a lower infestation rate of 1.4% and 21.9% in urban and peri-urban areas of Mwanza city in Tanzania while Patra et al. (2019) documented a 24.28% prevalence in the north-eastern region of India. On the contrary, Toure et al. (2024) reported a much higher rate (82%) of ectoparasites infestation of pigs in Ivory Coast. The differences observed in the prevalence of ectoparasitism of pigs reported in different locations could be attributed to differences in management practices like housing, feeding, provision and utilisation of pesticides. The difference in the prevalence could equally be as a result of differences in the number of samples taken from each farm and the diagnostic method adopted. The findings of this study further shows that *Haematopinus suis* was the most prevalent parasite species (37.68%) out of the five different ectoparasites seen. This result is in-line with the findings of Mwangi et al. (2018) who also reported *Haematopinus* *suis* as the most prevalent (96.1%) ectoparasite on pigs in Busia District, Kenya. The result also affirms the report of Braae et al. (2013) who reported Haematopinus suis as the most prevalent (63%) ectoparasite on pigs in a free-range system. However, this finding contradicts the work of Elom et al. (2021) who reported *Ctenocephalides* *canis* as the most abundant ectoparasite of pigs in Ebonyi State, southeastern Nigeria. Elsewhere in Hesse, Germany, Damriyasa et al. (2005) documented *Sarcoptes* *scabiei* as the most prevalent ectoparasite on pigs. The high rate of infestation by *Haematopinus* *suis* in this study could be due to the presence of environmental factors favoring the development of the parasite as well as the fact that this parasite spends it entire life cycle on its host. The disease-causing vectors were more prevalent in the study area. Hence, the observed pattern of ectoparasite diversity of these ectoparasites has potential implications for the risk of vector-borne diseases under future climate change (Balasubramanian et al., 2015 ; Rathinam and Sidhik, 2022). In the present study, pathogen studies were not carried on the different vectors reported. However, report in other vector-borne studies reported that Kyasanur forest disease was detected from Haemaphysalsi spp., ticks (Rathinam and Sidhik 2022).

With respect to location, ectoparasite infestation was more prevalent among pigs in Obiekezie farms compared to the other locations. Other researchers such as Mohammed et al. (2024) similarly reported higher infestation in other study locations compared to others. This observed differences in the different study sites may be due to level of exposure and poor management practices within the various farms.

The prevalence of ectoparasites in relation to age was equally studied and the result showed no significant association between the ectoparasites and age of the pigs (*p*=0.944). Although statistically not significant, the higher prevalence among age group 6-19 months pigs deviates from the work of Patra et al. (2019) that reported highest infestation of ectoparasites among piglets (1-5 months). Similar findings have been documented in southeast Nigeria where no significant association was found between gender and parasite infestation of pigs (Elom et al. 2021). Weaning time and management practices in younger pigs might probably be responsible since it greatly affects environmental, social and nutritional changes. This survey further revealed that female pigs (sow) had a higher prevalence of ectoparasites infestations compared to male pigs although the result was not statistically significant (p=0.822). This result agrees with the work of Patra et al. (2019) who also reported highest ectoparasites infestation in female pigs in India. In contrast, Mohammed et al. (2024) reported highest ectoparasite infestation on male pigs in Gombe State, Nigeria. Similar observations were also made by Kagira *et al*. (2013) in Kenya. This probably suggests a higher preference for male pigs by ectoparasite species. Although conflicting reports have been presented by different scholars on gender prevalence in pigs. There is no doubt that the level of exposure and available ecto parasite species in these areas play key roles.

1. **CONCLUSION AND RECOMMENDATION**

The study shows that infestation of pigs by ectoparasites is high in the study area. However, the attention given to pigs in general and parasite control in particular is grossly inadequate. The zoonotic potential of these parasites and associated health implications in both pig and humans entails that more efforts are needed in prevention and control strategies. Emphasis on use of intensive systems, regular training of farmers and involvement of veterinarians are recommended for effective pig management.

1. Limitation of the Study

The study animals which consisted of intensively reared pigs meant that the reported prevalence could not capture the entire pig infestation in the area since others were extensively reared.

**ETHICAL APPROVAL**

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Animal Research Ethics committee of Nnamdi Azikiwe University Awka (09/12/2024/ No: NAU/AREC/2024/0122).

**Consent**

As per international standards or university standards, farm manager’s written consent has been collected and preserved by the author(s).

**DISCLAIMER (ARTIFICIAL INTELLIGENCE)**

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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