

INTERNATIONAL JOURNAL OF AGRICULTURE, MANAGEMENT AND TECHNOLOGY



Vol 7(1) 2023

Published by
Federal College of Agriculture,
Ishiagu Ebonyi State

THE PREVALENCE OF HAEMOPARASITES OF CHICKENS SLAUGHTERED WITHIN UMUAHIA AREA OF ABIA STATE.

Onyeabor, A. I., Onunkwo, D.N and Kalu, C

¹Department of Veterinary Parasitology and Entomology, Michael Okpara University of Agriculture, Umudike, Abia state, Nigeria.

²Department of Animal Nutrition and forage science, Michael Okpara University of Agriculture, Umudike, Abia state, Nigeria.

Corresponding author; donunkwo1@gmail.com; Phone number:+2348033388622

ABSTRACT

This research study aimed to estimate the prevalence, identify parasite species, and investigate the associated risk factors for the occurrence of haemoparasites in chickens. A total of 167 blood samples were collected from both local and exotic breeds of chickens slaughtered within Umuahia, Abia State. These samples were transported to the Veterinary Parasitology and Entomology laboratory at Michael Okpara University of Agriculture, Umudike for identification. The results showed that 59 out of 167 chickens (35.3%) were infected with blood parasites. Among the infected chickens, 34 (35.0%) were females, while 25 (35.7%) were males. The prevalence of haemoparasites was higher in the local breeds of chicken, accounting for 70% of the infections, compared to 33.1% in the exotic breeds. Furthermore, 54 (38.6%) of the haemoparasite infections were recorded in adult chickens, whereas 5 (18.5%) occurred in the young chickens. The haemoparasites observed in the infected chickens included Plasmodium species, which infected 26 (44.1%) of the chickens, Leucocytozoon species infecting 22 (37.3%) chickens, and Haemoproteus species infecting 11 (18.6%) chickens. These findings provide valuable insights into the diversity of haemoparasites affecting the chicken population in the study area. Additionally, a significant difference in the Packed Cell Volume (PCV) was observed between infected and uninfected chickens. This suggests that haemoparasite infections may contribute to alterations in hematological parameters, specifically the PCV, which could have implications for the overall health and productivity of the infected chickens. This study highlights the prevalence of haemoparasite infections in chickens from Umuahia, Abia State. The findings demonstrate variations in infection rates between local and exotic breeds, as well as among different age groups of chickens. Furthermore, the identification of Plasmodium, Leucocytozoon, and Haemoproteus species emphasizes the diversity of haemoparasites affecting the chicken population. These findings contribute to our understanding of the epidemiology of haemoparasites in chickens and underscore the importance of effective management strategies to control and prevent these infections.

Keywords: haemoparasites, prevalence, chicken breeds, risk factors, Plasmodium, Leucocytozoon, Haemoproteus, Packed Cell Volume, epidemiology, management strategies

INTRODUCTION.

The Poultry Industry holds a significant position in providing animal protein to humans and plays a crucial role in the national economy as a revenue generator (FAOSTAT, 2005b). In Nigeria, poultry production encompasses the rearing of various avian species, including chickens (*Gallus domesticus*), ducks, guinea fowls, pigeons, turkeys, and ostriches (Opara et al., 2012). Among these species, chickens are the most intensively reared and prove to be more profitable for farmers (Mahmoud et al., 2016).

Chickens, as members of the *Gallus domesticus* species, are susceptible to various types of bacterial, viral, fungal, and parasitic pathogens. Parasitism has been identified as a significant threat to chicken production despite the pivotal role of chickens in human livelihoods (Lawal et al., 2016). Avian haemoparasites, specifically, pose a pathogenic risk to their hosts, resulting in high mortality rates and

reduced productivity in infected flocks (Merino et al., 2000).

Although poultry production is gaining popularity, the prevalence of haemoparasites and their impact on the health and productivity of chickens in the Umuahia area of Abia state, Nigeria, have not been adequately investigated. Consequently, this study aims to determine the prevalence and types of haemoparasites in chickens slaughtered at the Umuahia poultry market of Abia state.

To address the knowledge gap regarding haemoparasites in poultry, this research will employ a comprehensive approach to identify and quantify the prevalence of haemoparasitic infections in chickens within the Umuahia area. The findings will contribute valuable insights into the burden and significance of haemoparasitic infections on the poultry industry in the study area.

This study is essential for several reasons. Firstly, understanding the prevalence and types of

haemoparasites in chickens will provide vital information for farmers, veterinarians, and policymakers to develop effective strategies for disease prevention, control, and management. Such strategies can help mitigate the economic losses associated with haemoparasitic infections in poultry farms.

Secondly, investigating the health and productivity implications of haemoparasitic infections in chickens is crucial for maintaining food security. Chickens serve as a primary source of animal protein, and any disruption in their production due to haemoparasitic infections can lead to decreased availability of poultry products, potentially impacting the overall nutritional status of the population.

Lastly, studying haemoparasites in chickens slaughtered at the Umuahia poultry market will contribute to the existing body of knowledge on avian diseases in Nigeria. This information can guide future research endeavors and policy formulation aimed at improving poultry health and productivity nationwide. To achieve the objectives of this study, a cross-sectional survey will be conducted in the Umuahia area of Abia state. Blood samples will be collected from chickens slaughtered at the Umuahia poultry market, and microscopic examination will be performed to identify haemoparasitic infections. The prevalence rates of haemoparasites will be determined, and the types of haemoparasites will be identified using molecular techniques.

This research aims to fill the knowledge gap regarding haemoparasites in chickens within the Umuahia area of Abia state. The findings will contribute to our understanding of the prevalence and types of haemoparasites in chickens, their impact on health and productivity, and the overall implications for the poultry industry and food security. By addressing this research gap, valuable insights and recommendations can be generated to support disease prevention and control strategies, ultimately benefiting poultry farmers, consumers, and the economy as a whole.

MATERIALS AND METHODS

Study Location:

The study was conducted at the live poultry market of Umuahia in Abia State, Southeastern Nigeria. Umuahia is situated along the rail road between Port Harcourt to its South and Enugu to its North. The geographical coordinates of Umuahia are approximately 5°31'29.68"N latitude and 7°29' longitude (NRCRI, 2022).

Collection of Samples:

Several blood samples were collected using heparinized bottles immediately after the chickens were slaughtered at various poultry markets within Umuahia. A total of 2 mL of blood sample was collected at the point of slaughter from each chicken. The collected blood samples were transferred into sterile ethylenediaminetetraacetic acid (EDTA) coated bottles. Subsequently, the samples were transported in a flask containing ice packs to the Veterinary Parasitology Laboratory, Michael Okpara University of Agriculture Umudike (MOUAI), for further examination.

Thin Blood Smear Preparation:

Thin blood smears were prepared according to the standard procedures described by Thrall (2004). Drops of blood were placed at the end of grease-free glass slides and spread evenly using a spreader to create thin smears. The prepared smears were allowed to air dry completely and fixed with methanol for three minutes. Subsequently, the fixed smears were placed on a staining rack and covered with 10% Giemsa stain, which was left to stand for 30 minutes. After staining, the slides were flooded with tap water to dilute the stain and then allowed to dry. The examination of haemoparasites was performed using a light microscope with a X100 oil immersion objective.

Determination of Packed Cell Volume (PCV):

The microhaematocrit technique described by Coles (1986) was used to determine the packed cell volume (PCV). The blood sample was mixed thoroughly by gently rocking the sample bottle. A capillary tube was then inserted into the sample, and the bottle was tilted at an angle of approximately 45 degrees to facilitate the filling of the capillary tube by capillary action. When the tube was about 2/3 filled, a finger was placed over the open end of the tube before removing it from the blood to prevent the formation of air bubbles. The open end of the capillary tube was sealed using plastercin, and the sealed tube was placed in the groove of a centrifuge with the sealed end facing outward. The centrifuge was covered, and it was run at 10,000 rpm for 5 minutes. After centrifugation, the capillary tubes were carefully removed and read using a haematocrit reader. The results were expressed as a percentage.

RESULTS

The results are presented in tables 1-5

Table 1: Percentage prevalence of the entire bird population, number infected and PCV range.

Population type	Population size	Number of infected chickens	Percentage (%) prevalence	PCV (%) range
Entire birds examined	167	59	35.3	19-43
Adult(>6weeks)	140	54	38.6	19-43
Young (<6weeks)	27	05	18.5	20-43
Male	70	25	35.7	19-38
Female	97	34	35.0	20-43
Local	10	7	70.0	20-34
Exotic	157	52	33.1	19-43

Table 2: Individual Haemoparasites, prevalence, percentage prevalence and PCV range

Genus	Prevalence	Percentage prevalence	PCV (%)
Plasmodium	26	44.1	19-30
Leucocytozoon	22	37.3	20-32
Haemoproteus	11	18.6	21-34

Table 3: Prevalence of Haemoparasites in young and adults

Parasites	Overall prevalence	% prevalence	Young (% Prevalence)	Adult (% prevalence)
Plasmodium	26	44.1	60	48.2
Leucocytozoon	22	37.3	20	33.3
Haemoproteus	11	18.6	20	18.5

Table 4: Prevalence of Haemoparasites in Male and Female chickens

Parasite	Overall prevalence	Percentage prevalence	Male (% prevalence)	Female (% prevalence)
Plasmodium	26	44.1	48.0	41.2
Leucocytozoon	22	37.3	36.0	38.2
Haemoproteus	11	18.6	16.0	20.6

Table 5: Prevalence of Haemoparasites in Local and Exotic chickens

Parasite	Overall prevalence	% prevalence	Local (% prevalence)	Exotic (% prevalence)
Plasmodium	26	44.1	57.1	42.3
Leucocytozoon	22	37.3	42.9	36.5
Haemoproteus	11	18.6	0.0	21.2

DISCUSSION

Haemoparasite infections in poultry are considered endemic in Nigeria, as indicated by previous studies (Igbokwe *et al.*, 2008). In this current study, out of the 167 birds examined, 59 (35.3%) tested positive for haemoparasites belonging to three genera: Plasmodium (44.1%), Leucocytozoon (37.3%), and Haemoproteus (18.6%). These findings align with the reports of Karamba *et al.* (2012) and Lawal *et al.* (2016), who also identified the same three genera of haemoparasites in chickens. However, this contrasts with the results reported by Opara *et al.* (2016), Gimba *et al.* (2014), and Usman *et al.* (2012), who observed more than three genera of haemoparasites in chickens. The overall prevalence of haemoparasite infection in this study was 35.3%, which is consistent with the

findings of Emebet (2017), Maxwell *et al.* (2016), Poulsen *et al.* (2000), and Permin *et al.* (2002), who reported prevalence rates of 43.4%, 30.0%, 35.0%, and 32.0%, respectively. However, it differs from the lower prevalence rates reported by Opara *et al.* (2016), Lawal *et al.* (2016), and Adamu (2017), which were 17%, 17.9%, and 18.5%, respectively. These variations in prevalence rates may be attributed to differences in geographical locations, chicken breeds, management factors, seasonal availability of insect vectors, and sample sizes.

In this study, no statistically significant difference ($P < 0.05$) in the infection rate was observed between the sexes, suggesting that sex is not a risk factor for haemoparasite infection in chickens. This finding is consistent with the reports of Lawal *et al.* (2016),

Opara et al. (2016), and Al-barwari and Saed (2012), who similarly concluded that sex does not influence the acquisition of haemoparasite infections. However, it contrasts with the findings of Hasson (2015) and Opara et al. (2005), who reported a higher prevalence of parasitic infections in female chickens compared to male chickens. This discrepancy may be attributed to the reproductive activities of female chickens, which could lower their immunity. In contrast, Jegede et al. (2015) reported a higher parasitic infection rate in male chickens, possibly due to the abundance of predilection sites such as the comb and wattle, which are well supplied with blood vessels and attract blood-sucking arthropods that transmit haemoparasites.

The prevalence of haemoparasites varied among different age groups, with higher rates observed in adult chickens compared to young chickens. This finding aligns with the reports of Swai et al. (2010), Emebet (2017), and Sabuni et al. (2011). The higher prevalence in adult chickens can be attributed to their mobility and increased contact time with vectors while scavenging, unlike young chickens that are more protected and less exposed to the environment.

Regarding breed, local breeds exhibited a higher prevalence rate of haemoparasite infection (70.0%) compared to exotic breeds (33.1%). This finding agrees with the reports of Opara et al. (2016) and Minga et al. (2014), who similarly observed a higher prevalence of infection in local breeds than in exotic breeds. The intensive rearing practices of exotic breeds limit their contact with vectors of these parasites, whereas local breeds, which scavenge for food, are more prone to fly vectors of haemoparasites. In this study, haemoparasite-infected chickens exhibited lower mean Packed Cell Volume (PCV) values compared to non-infected chickens (19.0%), and this difference was statistically significant ($P < 0.05$). This result is consistent with the findings of Olayemi et al. (2014) and Motta et al. (2013), who reported lower PCV values in infected chickens. It suggests that haemoparasites can reduce the hematological values of chickens, and the stage and severity of the infections may influence the type and population of blood cells in the peripheral circulation, as well as the level of anemia (Cannell et al., 2013). Among the haemoparasite genera identified, Plasmodium species had the highest prevalence (44.1%), followed by Leucocytozoon (37.3%) and Haemoproteus (18.6%). These findings are consistent with the reports of Maxwell et al. (2016), Lawal et al. (2019), and Mohammed et al. (2019). However, this differs from the observations of Gimba et al. (2014) and Hasson (2015), who reported a higher prevalence of Haemoproteus in chickens. These discrepancies may be attributed to differences in climates and vector populations.

Haemoparasite infections in poultry are endemic in Nigeria, with Plasmodium, Leucocytozoon, and Haemoproteus being the predominant genera. The overall prevalence of haemoparasite infection in

chickens is influenced by various factors, including geographical location, chicken breed, management practices, seasonal variation in vector availability, and sample size. Sex does not appear to be a significant risk factor for acquiring haemoparasite infections, although some studies have reported sex-related differences. Adult chickens are more susceptible to haemoparasite infections due to their mobility and prolonged exposure to vectors. Local breeds are more vulnerable to haemoparasite infections compared to exotic breeds, likely due to differences in rearing practices and vector exposure. Haemoparasite infections can lead to decreased PCV values in infected chickens, indicating potential anemia. Plasmodium species were found to have the highest prevalence in this study, followed by Leucocytozoon and Haemoproteus. These findings contribute to the understanding of haemoparasite epidemiology in Nigerian poultry populations and highlight the need for effective control measures tailored to the specific factors influencing the prevalence and distribution of haemoparasites in chickens.

CONCLUSION

Findings from this study provides valuable insights into the prevalence, parasite species, and associated risk factors for haemoparasite infections in chickens within the Umuahia area of Abia State. The study revealed a high prevalence of haemoparasites in the chicken population, with 35.3% of the sampled chickens being infected. The local breeds of chickens exhibited a higher prevalence rate compared to the exotic breeds, indicating a potential difference in susceptibility to these infections. Additionally, variations in infection rates were observed among different age groups, with adult chickens showing a higher prevalence compared to young chickens.

The identification of Plasmodium, Leucocytozoon, and Haemoproteus species as the predominant haemoparasites infecting the chickens highlights the diversity of these pathogens in the study area. The study also revealed a significant difference in the Packed Cell Volume (PCV) between infected and uninfected chickens, suggesting that haemoparasite infections may have implications for the hematological parameters and overall health of the infected chickens.

Overall, this research contributes to the understanding of the epidemiology of haemoparasites in chickens and emphasizes the importance of implementing effective management strategies to control and prevent these infections. The findings underscore the need for continued surveillance and targeted interventions to safeguard the health and productivity of chicken populations in the Umuahia area and similar regions.

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