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Survey of Ectoparasites of Bovid Animals in Nanka and Nnobi Towns of Anambra State, Nigeria

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ABSTRACT
Ectoparasite infestations remain a major constraint on livestock productivity in Nigeria. This study was carried out to survey ectoparasites infesting bovid animals in Nanka and Nnobi towns in Anambra State, Nigeria. A total of 198 animals (77 goats, 68 sheep, 53 cattle) were randomly selected and examined for this study. Identification of ectoparasites was done using standard Entomological keys. Data was analyzed using chi-square and $p \leq 0.05$ were considered significant. Overall, 195 animals were infested with an overall infestation prevalence of 98.5%. Cow had the highest infestation prevalence (100%) followed by goats (98.4%) while sheep a slightly lower prevalence **(**97.1%). Gender and location differences were statistically insignificant ($P > 0.05$) across all bovids**.** Predilection site distribution was highly significant ($P = 0.000$) for all the different animals examined. The abdomen was the most infested site; 36.1%, 50.0% and 44.8% for Goat, Sheep and Cow respectively while ear and mammary gland were least infested sites in goat (8.2%), sheep (2.9%) and cow (3.0%). Overall, bovid animals from Nanka had the highest infestation prevalence (99.0%) while those from Nnobi has a slightly lower prevalence of 98.0% (P=0.573). Four ectoparasite genera were identified: *Argas* (68.5%), *Amblyomma* (23.9%), *Dermacentor* (5.4%), and *Ctenocephalides* (2.2%). *Argas* (35.8%) and *Amblyomma* sp (41.6%) were most abundant on cow while *Demacentor* was most abundant on goat (40.0%) and sheep (40.0%). *Ctenocephalides* had the highest abundance on goat (75.0%) while none was recovered on cow (0.0%). The extremely high prevalence highlights inadequate control practices and favorable environmental conditions for ectoparasite survival. These findings stress the need for integrated ectoparasite management, including farmer education, regular acaricide application, and improved husbandry practices, to mitigate economic losses and reduce vector-borne disease risks in southeastern Nigeria.

Keywords: Anambra, Bovid animals, Ectoparasites, Nigeria, Survey

INTRODUCTION

Bovids are a diverse group of ruminant mammals that have hooves and unbranched hollow horns (Castelló *et al.*, 2016). Bovid animals are characterized by the presence of horns composed of keratinized sheaths covering a bony prominence of the frontal bone, which are never shed. Domesticated bovids such as cattle, goats, and sheep are widely kept for livestock production, while wild species like gazelles and antelopes remain significant in ecological and conservation studies (Muhammad *et al.*, 2021). Ectoparasites are organisms that live all or part of their lives on the surface of larger organisms, which they depend on for food, shelter, and other basic needs to survive (Emmanuel *et al.*, 2017). Major ectoparasites include ticks, mites, lice, sheep ked, flies, and fleas being the major ones that directly or indirectly affect Animals (Sarfraz *et al.*, 2023). Ticks, mites, lice, and fleas have been noted as ectoparasites of Livestock (Emmanuel *et al.*, 2017). Some bovid animals play a major role in food production, for example, cattle, sheep, goats and dogs provide meat and milk for consumption, while sales of leather obtained from cattle serve as a means of earnings for farmers, and it is also consumed as protein in several cuisines and delicacies (Shiferaw, 2018). These animals not only produce meat to be consumed by humans but also produce a significant amount of waste, including carcasses, inedible body parts, blood, bones, and animal hides (Bandaw and Herago, 2017; Tolera and Alemu, 2020). Hides and skins, which are one of the most valuable solid wastes from meat processing, are widely used in the leather industry (Kanagaraj *et al*., 2015; China *et al*., 2020).

Despite the numerous benefits accrued from bovid animals, they are plagued by ectoparasites, which affect their productivity. Ectoparasites are very common and widely distributed in all agro-ecological zones in Nigeria (Ahaotu *et al*., 2024). Ectoparasites such as lice, sheep keds, ticks, fleas, and mange mites are among the most important health problems for bovids in Nigeria (Werede and Afera, 2014). Ectoparasitic infestation poses the greatest threat to cost-effective livestock production (Ashraf *et al*., 2016).

Ectoparasites are involved in mechanical damage, anemia, bottle jaw, hypoproteinemia, rough hair coat and anorexia (Abah *et al*., 2022). Indirect effects of ectoparasites consist of transmission of pathogens that cause babesiosis, theileriosis, anaplasmosis, and more (Iqbal *et al*., 2014). Several studies have reported the presence of ectoparasites on cattle in different parts of Nigeria and beyond. For instance, *Rhipicephalus appendiculatum, Boophilus microplus, Amblyomma variegatum and Hyalomma truncatum* have been commonly recovered from cattle (Ude *et al*., 2024; Ada *et al*., 2021). Similarly, *Psoroptes ovis*, *Sarcoptes scabiei*, *Bovicola bovis*, *Haematopinus quadrpertusis*, *H. eurysternus*, *H. tuberculatus*, *Linognathus vituli*, *Amblyomma variegatum*, *Boophilus decoloratus*, *Hyalomma dromedarii*, *H. anatolicum*, *H. excavatum*, *Haemaphysalis punctata, and Rhipicephalus singuanieus* have also been documented as cattle ectoparasites, with significant effects on animal health and productivity (Sarfraz *et al.*, 2023).

Some parasites even cause diseases in humans when preventive measures are ignored (Iqbal *et al*., 2014). In addition, ectoparasite infestations could induce great economic losses due to reduction of wool quality, meat and

milk yield. There are also losses incured due to culling which be related to cost of treatment and prevention of the problem (Seyoum *et al*., 2015). They are also responsible for great preslaughter skin defects, resulting in downgrading and rejection of small ruminant skins (Yacob, 2014). Some ectoparasites act as vectors of disease organisms and often trigger severe itching that makes animals unable to feed and grow well (Igbokwe and Maduka 2018). In rural and semi-urban markets, bovid animals are often traded for commercial purposes with little veterinary inspection, making them susceptible to ectoparasitic infestations. These infestations lead to disruptions in animal production and may present public health concerns owing to the zoonotic potential of the ectoparasites, such as scabiosis, and the pathogens they harbor (Insyari'ati *et al.,* 2024).

Despite the recognized importance of ectoparasite control, there is a scarcity of region-specific data regarding the prevalence, types, and risk factors associated with ectoparasite infestations in bovid animals sold at local markets such as Nanka and Nnobi. This lack of information hinders the development of targeted and effective control strategies, which are essential for improving animal health, productivity, and the economic returns from livestock. Therefore, this study was carried out to survey and provide information on the ectoparasites of bovid animals in Nanka and Nnobi markets, Anambra State, Nigeria.

MATERIALS AND METHODS

Study Area

This study was carried out from June – July 2025 in Nanka (Latitude**:** 6.0158° N and Longitude**:** 7.0802° E) and Nnobi (Latitude**:** 6.0446° N and Longitude**:** 6.9927° E) local markets, Anambra State, Nigeria (Figure 1). Most residents are farmers, traders, craftwork and civil servants. The town experiences two distinct seasons: a long rainy season between April and October, and a dry season from November to March, which influences both farming cycles and daily routines. Both Nnobi and Nanka markets are important meeting points where agricultural products including livestock such as cow, goat and sheep are sold and slaughtered for human consumption.

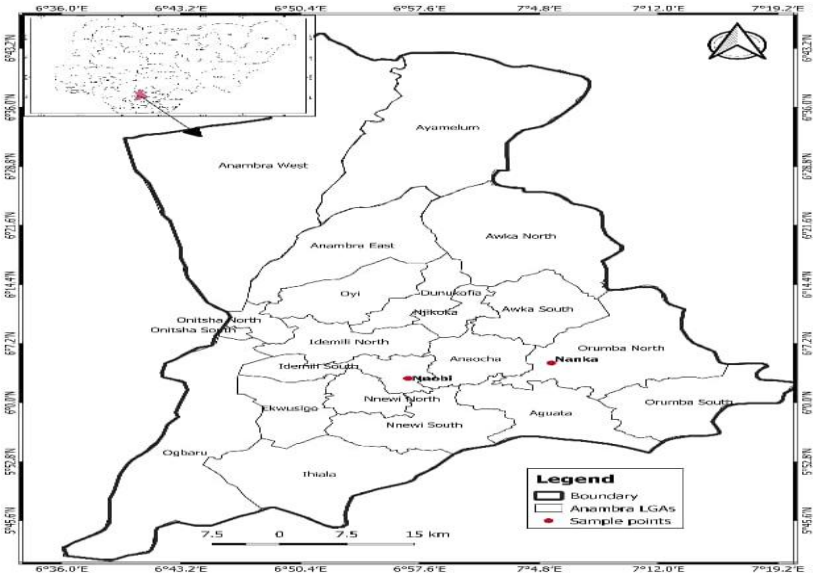

Figure 1: Map of Anambra State Showing the Study Locations
Source: GIS Lab, Geography and Meteorology, Nnamdi Azikiwe University, Awka 2025

Ethical Approval

Ethical approval to carry out this study was obtained from the Animal Research Ethics Committee of Nnamdi Azikiwe University, Awka, and was assigned with reference number NAU/AREC/2025/0069

Population of the Study

A total number of 198 bovid animals were randomly sampled from Nanka and Nnobi towns (Nanka: 30 goats, 34 sheep, and 33 cows, while Nnobi: 31 goats, 36 sheep, and 34 cows).

Collection of Ectoparasites

The ectoparasites were collected following the method of Khan *et al*. (2019). A thorough examination of the animals was conducted for 8 weeks from June to July 2025. On each visit, the animals were randomly selected and the skin was examined thoroughly by visual examination and inspection of the ear, tail, neck, abdomen, scrotum (in males) and mammary glands (in females) by combing the hairs to reveal the ectoparasites within. Ectoparasites encountered were carefully using spatula into vial bottles containing 70 % ethanol to avoid damage, which may make identification difficult or impossible. The bottles were labeled, indicating the date and time of collection, and the part of the animal from which it was collected. Thereafter, they were transported to the Zoology Laboratory, Nnamdi Azikiwe University, where they were identified and stored for further handling.

Identification of Ectoparasites

Ectoparasites collected were placed on sterile glass slide and viewed by direct examination using microscope. Mites were examined under light microscope, while ticks were examined with the aid of a dissecting stereomicroscope and identification was done using the keys described by Strickland *et al*. (1976).

Statistical Analysis

Data generated from this study was subjected to statistical analysis using SPSS Version 22. Prevalence rate was determined according to Bush *et al*. (1997) and expressed as percentages. Pearson Chi-square test was used to determine the association between the prevalence of infection and the

risk factors studied, and p-value ≤ 0.05 was considered significant.

RESULTS AND DISCUSSION

Prevalence of ectoparasite infestation among the bovid animals studied

A total of 198 bovid animals comprising goat (61), sheep (70), and cow (67), were examined for this study. Out of these, 195 bovid animals were found to be infested by ectoparasites with an overall prevalence of 98.5%. The cows had the highest prevalence of ectoparasite infestation (100%), followed by goat (98.4%), while the lowest prevalence was recorded in sheep (97.1%). Prevalence of ectoparasite infestation among the bovid animals was not statistically significant, P=0.390 (table 1). Ectoparasites represent one among the major challenges to the development and utilization of animal resources and causes huge livestock production losses. The overall ectoparasite prevalence of 98.5% observed among bovid animals in Nnobi and Nanka indicates an extremely high burden of infestation in the study area. The overall prevalence recorded in this study is at variance with several other studies carried out in different parts of Nigeria. For instance, prevalence rate reported in the current study is higher than the 27.1% and 10.0% documented by Usman *et al*. (2023) and Kagira and Kanyari (2001) in Biu Borno State and Central Kenya respectively. However, Ude *et al*. (2024) recorded 76.3%–86.6% in Ebonyi State. Similarly, Emmanuel *et al*. (2017) reported 86% tick prevalence in Wadata Market, and Ogbuefi *et al*. (2025) documented 76% infestation in Anambra abattoirs. Furthermore, prevalence rates of ectoparasites infestation 100%, 98.4% and 97.1% reported in this study among the different host species (cattle, goat and sheep) is quite high and very alarming. These figures are much higher than those in the study by Suleiman *et al*. (2025) that reported ectoparasites prevalence of 75.0%, 58.3% and 37.5% in Katsina central abattoir, Nigeria. This finding further contradicts the work of Ude *et al*., (2024), who found lower infestation in goats (51.5%) and sheep (31.5%) relative to cattle (85%). The near-uniform infestation in the current study suggests similar exposure across species, possibly because they share pastures and rearing enclosures. The differences observed in the prevalence rates could be attributed to regional climatic conditions, management practices, sample size and sampling methods.

Table 1: Prevalence of Ectoparasites Infestation among the Bovid Animals Studied

Bovid Animal	Number Examined	Number Infested	Prevalence (%)
Goat	61	60	98.4
Sheep	70	68	97.1
Cow	67	67	100
Total	198	195	98.5
χ^2=1.882	df=2	P=0.390	

Risk Factors Influencing the Presence of Ectoparasites in the Bovid Animals

Prevalence of Ectoparasite Infestation in Goat, Sheep and Cattle According to Gender, Location, and Predilection Sites

Out of the 61 goats examined in this study, 60 were found to be infested by ectoparasites with an overall prevalence of 98.4%. Male goats recorded the highest prevalence of ectoparasite infestation (100%) while female goats had a lower prevalence of infection (96.8%). The result of gender-based prevalence in goats was not statistically significant P=0.321 (table 2). With respect to study location, goats sampled from Nnobi recorded the highest prevalence of ectoparasite infestation (100%) while goats from Nanka had a lower prevalence (96.7%). Location based prevalence among the goats was also statistically insignificant (P=0.305). With respect to predilection site, the neck was the most infested region among goats (19) with the highest infestation prevalence of 31.7% followed by the abdomen 22(36.1%), scrotum 7(23.3%), mammary gland 5(16.1%), ear 5 (8.2%) while tail was the least infested region among the goats 4(6.6%). The result was statistically significant P=0.000 (table 2). Out of the 70 sheep sampled, a total of 68 were found to be infested with an overall prevalence of 97.1%. Based on gender, male sheep had the highest prevalence of infestation (97.5%) while female sheep had a slightly lower prevalence (96.7%). Gender-based prevalence in sheep was not significant P=0.836 (table 2). According to study location, sheep sampled from Nanka recorded the highest prevalence of infestation, 34 (100%), while those sampled from Nnobi had a lower prevalence of 94.4% (p=0.163). With respect to predilection site, the abdomen was found to be the most infested body region in sheep (35), with the highest prevalence of 50.0% followed by the neck 14 (20.0%), mammary gland 6 (20.0%), scrotum 6 (15.0%), and tail 6 (8.6%). The ear region was found to be the least infested predilection site in sheep 2 (2.9%) and the result was highly significant p=0.000. All of the 67 cows examined in this study were found to be infested by ectoparasites, with an overall prevalence of 100.0 % (table 2). Gender-wise, all 34 male cow and 33 female cows sampled in this study were infested (100.0 %) each respectively. Similarly, all 34 and 33 cow sampled from Nanka and Nnobi respectively, were infested by ectoparasites. According to predilection site, the abdomen was found to be the most infested predilection site 30 (44.8%) followed by neck 14(20.9%), scrotum 5(14.7%), tail 8(11.9%), ear 6(9.0%) while mammary gland was the least infested predilection site in cow 1(3.0%). The result was statistically significant p=0.000.

Table 2: Prevalence of Ectoparasites Infestation in Goat, Sheep and Cattle According To Gender, Location and Predilection Sites

Goat	Number Examined	Number Infested	Prevalence (%)	χ^2	Df	P-value
Gender						
Male	30	30	100.0	0.984	1	0.321
Female	31	30	96.8			
Total	61	60	98.4			
Location						

Goat	Number Examined	Number Infested	Prevalence (%)	χ^2	Df	P-value
Nanka	30	29	96.7	1.051	1	0.305
Nnobi	31	31	100.0			
Total	61	60	98.4			
Predilection Site						
Neck						
Tail	61	19	31.7	27.214	5	0.000
Abdomen	61	4	6.6			
Ear	61	22	36.1			
Scrotum	61	5	8.2			
Mammary gland	30	7	23.3			
Total	31	5	16.1			
Sheep	304	62	20.4			
Gender						
Male						
Female						
Total	40	30	100	0.984	1	0.321
	30	30	96.8			
Location	70	60	98.4			
Nanka						
Nnobi						
Total	34	34	100	1.944	1	0.163
	36	34	94.4			
Predilection Site	70	68	97.1			
Neck						
Tail						
Abdomen						
Ear	70	14	20.0	59.191	5	0.000
Scrotum	70	6	8.6			
Mammary gland	70	35	50.0			
Total	70	2	2.9			
	40	6	15.0			
Cattle						
	30	6	20.0			
Gender	350	69	19.7			
Male						
Female						
Total						
Location	34	34	100	0.000	1	1.000
Nanka	33	33	100			
Nnobi	67	67	100			
Total						
Predilection Site	34	34	100	0.000	1	1.000
Neck	33	33	100			
Tail	67	67	100			
Abdomen						
Ear						
Scrotum						
Mammary gland	67	14	20.9	41.343	5	0.000
Total	67	8	11.9			
	67	30	44.8			
	67	6	9.0			
	34	5	14.7			
	33	1	3.0			
	335	64	19.1			

The results of this study reveal there was no significant differences of infestation in Gender and location across the different bovid animals (goats, sheep, or cattle). This finding is similar to the work of Adamu, Onawo and Adebayo (2018) and Anifowose *et al*. (2020), who both found no gender-based differences in Nasarawa and Ogun States respectively. The result of the present study is however, in contrast to that of Babagana (2019) who reported a significantly higher prevalence in females. Equally contradicting the result of the present study, Iposu *et al*. (2014) found significant associations in age and breed in Abeokuta, Ogun State, Southwestern Nigeria. The predilection site distribution of

ectoparasites was highly significant (P = 0.000) for all the bovid animals. In goats, abdomen and neck were the most infested sites; whereas in sheep and cattle, the abdomen predominated, followed by neck, scrotum/udder, and tail. This result aligns with the work of Ikpeze *et al*. (2015), who recorded scrotum/udder, tail, back, and neck as preferred sites on cattle in Amansea. On the contrary, Suleiman *et al*. (2025) reported highest ectoparasite infestation in the inner thigh and armpit while Ogbuefi *et al*. (2025), reported udder/scrotum as the most infested region in Anambra State. Adamu *et al*. (2018) also found major infestations at the thigh, abdomen, neck, and back. According to Muchenje *et al*. (2008), ectoparasites infestation (especially ticks) of certain sites could be due to the fact that ticks prefer thin skin, moist, warmer and hidden sites with adequate vascular supply. The preference for soft, thin-skinned, vascularized areas reflects ectoparasite feeding efficiency.

Overall Prevalence of Ectoparasite Infestation in Nanka and Nnobi

Out of the two locations sampled, Nanka market recorded the highest ectoparasite infestation of its bovid animals 97 (99.0%) while Nnobi had a slightly lower prevalence of ectoparasite infestation of its bovid animals 98 (98.0%). The result was not statistically significant p=0.573 (table 3).

Table 3: Overall Prevalence of Infestation in Nanka and Nnobi

Location	Number Examined	Number Infested	Prevalence (%)	χ^2	Df	P-value
Nanka	98	97	99.0	0.318	1	0.573
Nnobi	100	98	98.0			
Total	198	195	98.5			

The overall location-based prevalence of infestation in the two study locations (Nanka and Nnobi) showed no significant association (p=0.573), although bovid animals from Nanka were slightly more infested compared to those from Nnobi. While the result was not significant, this finding is in-line with the work of Abah *et al*. (2022) who also reported differences in the infestation rate among animals examined from four different locations in Port Harcourt, Rivers State. The near similar prevalence of 99.0% and 98.0% each observed in Nanka and Nnobi respectively indicates the alarming rate of ectoparasites infestation in both locations. The high prevalence observed in both areas could be explained by the fact that Nnobi and Nanka are humid, with abundant vegetation and year-round grazing; factors that favor tick survival. The implication of this finding is that all subgroups (bovids) in the study area are equally at risk, which implies that targeted interventions by sex or a particular village are unlikely to yield the desired results but a rather more holistic or general approach to interventions.

Overall Percentage Abundance of Ectoparasites Species Identified from the Study

A total of 371 parasites from four different species comprising *Argas* sp, *Ambyomma*, *Demacentor* and *Ctenocephalides* were recovered from the bovid animals in this study (table 4). Out of these, *Argas* sp (68.5%) was the most abundant species (254), followed by *Amblyomma* species 89(23.9%), *Demacentor* 20(5.4%) while *Ctenocephalides* sp was the least recovered ectoparasite 8 (2.2 %). The result was found to be highly significant p=0.000

Table 4: Overall Percentage Abundance of Parasite Species Isolated and Identified from Bovid Animals

Parasite Species	Number Recovered	Abundance (%)
Argas sp	254	68.5
Ambyomma sp	89	23.9
Demacentor	20	5.4
Ctenocephalides	8	2.2
Total	371	100

This finding disagrees with Suleiman *et al*. (2025) that reported *Boophilus decolaratus* and *Linognathus africanus* as the most abundant ectoparasite species. The ectoparasites reported in this study are also in contrast to the studies conducted in Port Harcourt, Nigeria, by Abah *et al*. (2022) who documented *Culiseta spp*, *Demodex spp*, and *Damalimia spp*. While *Amblyomma variegatum* has been reported as predominant in many Nigerian studies (Isaac *et al*., 2019; Ogbuefi *et al*., 2025; Babagana, 2019), *Argas* dominance here suggests that local ecological factors favor soft ticks. The absence of *Ctenocephalides* in cattle but presence in goats and sheep is consistent with Adamu *et al*. (2018), who found flea infestations more common on smaller ruminants. Although comparative abundance across host species was not significant (P = 0.069), trends such as more *Amblyomma* on cattle and more *Ctenocephalides* on goats is similar with patterns observed by Ude *et al*. (2024) and Obi *et al*. (2014). The abundance of these parasites on the animals in the study area poses a significant problem as they continue to threaten animal health, and livestock rearing within the area.

Figure 2: *Demacentor spp* (Ixodid tick)

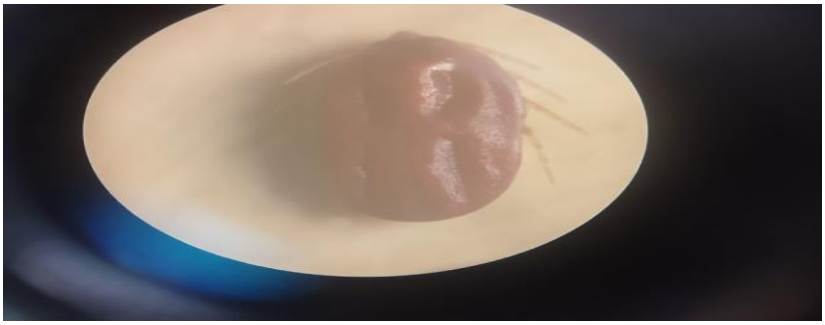

Figure 3: Argasidae spp (Soft tick)

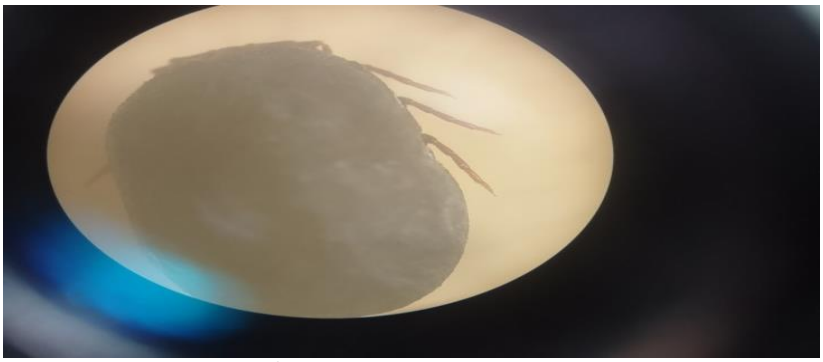

Figure 4: Argasidae spp (Soft tick)

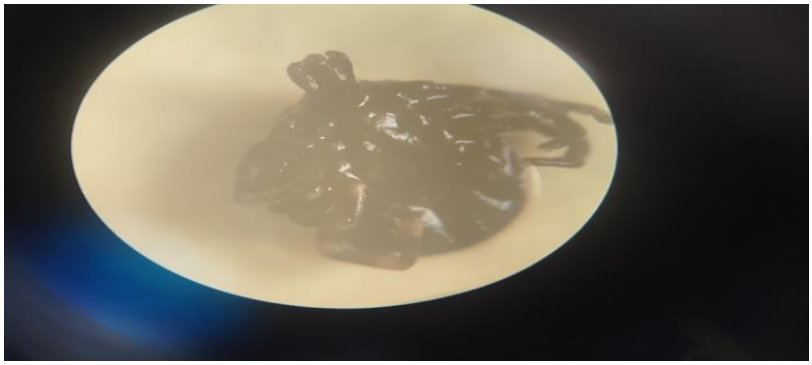

Figure 5: Ventral view of Ixodid tick (*Amblyomma spp)*

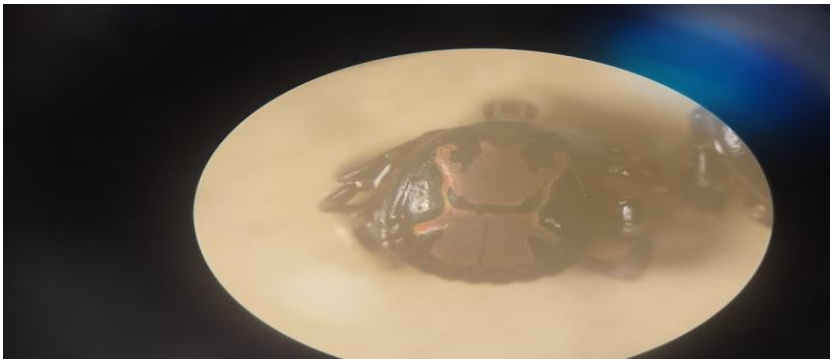

Figure 6: Dorsal view Ixodid tick (*Ambylomma spp)*

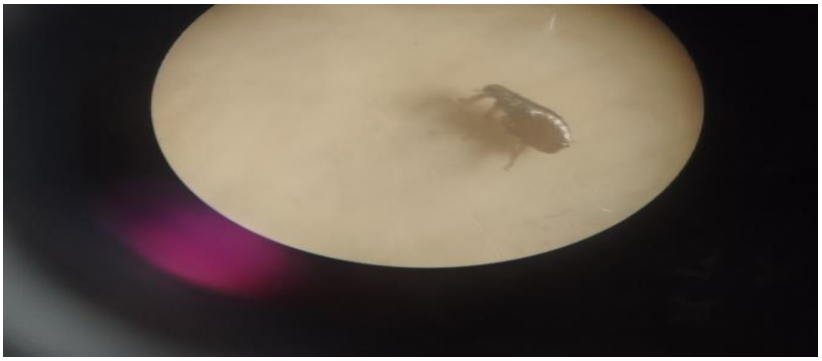

Figure 7: Flea (Ctenocephalides)

Comparative Percentage Abundance of Parasite Species Recovered from the Study Animals

A comparative assessment of the abundance of the ectoparasites infesting the bovid animals (goat, sheep and cow) sampled in this study was evaluated as presented in table 6 below. The highest number of *Argas* sp 91 (35.8%) was recovered among cow followed by goat 82(32.3%) while the lowest abundance was seen in sheep 81(31.9%). *Ambyomma* sp was also most abundant in cow 37(41.6%) followed by sheep 29(32.6%) while it was last seen in goat 23(25.8%). *Demacentor* was most abundant in goat and sheep 8(40.0%) each while cow had the least number of recovered *Demacentor* 4(20.0%). On the other hand, *Ctenocephalides* was most abundant in goat 6(75.0%) followed by sheep 2(25.0%) while no *Ctenocephalides* was recovered in cow. The result of the abundance of ectoparasites species across the three bovid animals sampled was not statistically significant p=0.069

Table 5: Comparative Percentage Abundance of Parasite Species Recovered from the Study Animals

Parasite species	**Bovid Animal**			**Total**	χ^2	**Df**	**Pvalue**
	Goat	**Sheep**	**Cow**				
Argas sp	82(32.3)	81(31.9)	91(35.8)	254	11.696	6	0.069
Ambyomma sp	23(25.8)	29(32.6)	37(41.6)	89			
Demacentor	8(40.0)	8(40.0)	4(20.0)	20			
Ctenocephalides	6(75.0)	2(25.0)	0(0.0)	8			
Total	119(32.1)	120(32.3)	132(35.6)	371			

This result is in-line with Wahab and Okunlola (2021) that also reported highest species abundance (170) in cattle compared to sheep and goat. On the contrary, Augustus *et al*. (2024) reported *Amblyomma* species as the most abundant (39) ectoparasite species in sheep while also documenting *Rhipicephalus appendiculatus* (40) as the most abundant ectoparasite species of goat in Ebonyi State, South Eastern Nigeria. Similarly, other researchers have reported similar ectoparasites including *Amblyomma* species and *Ctenocephalides* among bovid animals in different regions. However, contrary to the findings of this study, several researchers have documented varying ectoparasites species among bovids globally. For instance, Elati *et al*. (2024) reported *Psoroptes ovis* among sheep in Central Tunisia. Other researchers such as Sarfraz *et al*. (2023) and Ude *et al*. (2024) have also documented different ectoparasites including *Rhipicephalus appendiculatum, Boophilus microplus, Sarcoptes scabiei, Bovicola bovis, Haematopinus quadrpertusis, H. eurysternus, H. tuberculatus, Linognathus vituli, Boophilus decoloratus, H. anatolicum, H. excavatum, Haemaphysalis punctata, and Rhipicephalus singuanieus* as cattle ectoparasites, contrary to the findings of this study (Sarfraz *et al*., 2023). The variations observed in ectoparasites abundance and presence on the various animals could be attributed to poor animal health, inadequate management practices, favourable climatic conditions that facilitate breeding, parasite density and resistance to treatment.

CONCLUSION

This study demonstrates that ectoparasite infestation among bovids in Nnobi and Nanka, Anambra State is widespread, severe and overwhelmingly high. Infestation was consistently high across cattle, sheep, and goats**,** with no significant differences by gender or location, indicating uniform exposure throughout the area. *Argas* species dominated the ectoparasite fauna, while abdomen and neck were the most frequently infested predilection sites. The findings suggest possible inadequate control measures and environmental conditions conducive to ectoparasite survival in southeastern Nigeria. Unchecked infestations can impair livestock health, reduce productivity, and facilitate transmission of vector-borne pathogens. Effective management should therefore combine farmer education**,** strategic acaricide use**,** improved housing and pasture practices**,** and routine surveillance. Continued monitoring and region-specific control strategies are essential to reduce ectoparasite burdens and safeguard livestock production in the study area.

Based on the findings of this study, the following recommendations are hereby made:

i. Regular inspection and acaricide treatment of goats, sheep, and cattle should be conducted to reduce the prevalence of ectoparasites and minimize production losses.
ii. Strict hygiene and improved husbandry practices should be maintained in bovid housing and grazing areas, including proper waste disposal, clean bedding, and pasture rotation.
iii. Livestock owners, handlers, and community members should be educated on the health and economic risks associated with ectoparasites and the importance of early detection and control.
iv. Relevant veterinary and agricultural authorities should enforce guidelines on ectoparasite control, animal movement, and farm sanitation to limit the spread of infestation.

v. Further research should investigate seasonal patterns of ectoparasite infestation, explore host-parasite interactions, and include molecular identification of parasites for improved accuracy.

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