

Probability of Ticks Infestation in Goats Sold in Okitipupa Main Market, In Southern Part of Ondo State

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Abstract: Ticks are the most important ectoparasites of livestock in tropical and sub-tropical areas. They are responsible for severe economic losses both through direct effects of blood sucking and indirectly as vectors of pathogens and toxins. Feeding by large numbers of ticks causes reduction in live weight gain and anaemia among domestic animals. An epidemiological study was carried out on ticks of goat in Okitipupa main market in Southern part of Ondo State from September, 2021 to November, 2021. Goats were sampled randomly. Collected ticks species were preserved in 70% ethanol to be counted and morphologically identified to the species level. A total of eighty (80) goats were examined, thirty-five (35) of the goats examined were infested out of which (20) female and (15) male were infested. One hundred and eleven (111) species which were largely *Amblyomma variegatum*, the most predominant hard tick species was identified. The main attachment/predilection sites of tick detected were head (33), neck (9), back (13), abdomen (39) and leg (17) which is significant to the tick infestation. The infestation rate of tick was insignificantly different between sex, female (46.5%) and male (40.5%). Therefore, to reduce high prevalence of tick, proper and planned control measure by creating awareness about the importance and control of ectoparasites for farmers is needed.

Key words: Prevalence, Tick, Predilection, Ectoparasites, Infestation, Goat

I. INTRODUCTION

Ticks are ectoparasites of ruminants and other domestics and wild animals living by haematophagy on blood causing skin irritation and anemia (Wilson, 1990). Ticks are among the most difficult ectoparasites of domestic animals to control (Walker *et al.*, 2007). Ticks are also one of the major vectors of pathogens, such as *Babesiosis*, *Theileria*, *Anaplasmosis*, *Dermatophilosis* and so on to animals in the world (Soulsby, 1982; Morel, 1989). Severe irritations caused by their bites especially when numerous can result to severe emaciation as animals do not settle down to eat properly and rest. The large volume of blood they suck when they occur in large number can lead to anaemia which in turn results in weakened stock. Their bites cause serious damage to hides and skins which are valuable export products in Nigeria (Fabiya, 2007). It is important to know the prevalence of the

ticks species involved in the transmission as well as their geographical distribution for the control of ticks borne diseases (Gholan, *et al.*, 2007).

Goat is an important livestock species all over the globe and especially in tropical and subtropical regions. It has a pivotal place in small scale farming and the rural economy of developing societies by generating employment and supplementing house hold income. Goats are primarily raised for leather, milk and hair production (Hassan *et al.*, 2011). In many parts of the world, goats and cattle production is a profitable enterprise because of the high demand for dietary animal protein (Anaeto *et al.*, 2009). Goats as small ruminants have some advantages over larger animals such as cattle, because of their lower purchase price, higher fecundity and prolificacy, ability to survive on low quality diet in difficult conditions, availability and ease domestication.

Goats can suffer from a range of ectoparasites and the major ones include ticks, mites, lice, fleas and flies (Zewdie, 2010). The ectoparasites feed on body tissue such as blood, skin, and hair. Heavy infestations are associated with anaemia as adult female ticks can, for example, suck up to 10 ml of blood. The saliva and faeces of some ectoparasites such as lice contain substances capable of causing allergies giving rise to severe irritations to the skin (Clark and Milne, 2003). In rural areas where co-habitation between animals and human is common, the potential of human infection by some of the ectoparasite borne pathogens are high (Adu, 2000).

In Nigeria, ticks are the most important ectoparasites of farm livestock because of their heavy rate of infestation causing significant damage to hide and skin as well as transmitting diseases to their host. Amuta *et al.* (2010) reported high prevalence of *Sanguineus rhipicephalus* (80.5%), *Boophilus annulatus* (14.6%), *Hyloma truncatus* (4.7%) infesting dogs in Wurukum, Makurdi, Nigeria. Stachurski and Lancelot (2006) picked up 90% of adult *Abyomma variegatum* in cattle when the animals returned from pasture in the evening. El-Kammah *et al.* (2001) reported that an average daily infestation of about 50 engorged *Boophilus* tick is capable of causing substantial

loss in dairy product and beef. (Knipling and Steelman, 2000) stated that *Boophilus annulatus* can spread cattle tick fever and Texas fever from one cattle to another. The large numbers of ticks seen on cattle, sheep, goat, horses and camels have been attributed to their methods of grazing (Iwuala and Okpala, 1978; James-Rugu and Iwuala, 2002).

Ectoparasites of small ruminants cause mortality, decreased production and reproduction of small ruminants and also they cause serious skin defects that end up with down grading of quality and rejection of skin (Bayu, 2005; Tefera and Abebe, 2007a, Mulugeta *et al.*, 2010).

Ticks are capable of transmitting several important protozoans, rickettsia, bacterial, fungal and viral diseases to animals and humans. This leads to great economic loss and impart negatively on human health (Allan *et al.*, 2003). Ticks are also vectors of Lyme disease which may have long-term severe, chronic and disabling effects on humans (Feder Jr. *et al.*, 2007).

The average African farmers without livestock are highly vulnerable to malnutrition and poverty because of their inability to purchase protein-rich foodstuffs like meat and meat products. Coupling crop farming with livestock provides an avenue for meeting their nutritional needs as well as generates extra income to supplement their meagre income (Chaminuka *et al.*, 2014).

However, livestock farming is perennially plagued with infestation of ectoparasites. Livestock is affected by infestation of different arthropod ectoparasites, but little has been documented on their effects on productivity in Nigeria, which may serve as guide to most appropriate and sustainable control methods of arthropod ectoparasites infestation on ruminant livestock especially goats.

For many smallholder farmers, livestock is the only ready source of cash to buy inputs for crop production, seeds, fertilizers and pesticides (Chaminuka *et al.*, 2014). Livestock income also goes towards buying things the farmers cannot make for themselves. And that includes paying for school fees, utilities, medicine and taxes (Schiere *et al.*, 2002). Income from cropping is highly seasonal. Larger animals such as goat are a capital reserve (Padjung and Natsir, 2005), built up in good times to be used when crop yields are poor or when the family is facing large expenses such as the cost of a wedding or hospital bills.

Furthermore, livestock are closely linked to the social and cultural lives of several million resource-poor farmers for whom animal ownership ensures varying degrees of sustainable farming and economic stability (Sansoucy, 1995). They contribute substantially and directly to food security and human health. For poor and under-nourished people, particularly children, the addition of modest amounts of livestock products to their diets can have substantial benefits for their physical and mental health (Thornton, 2010).

Anything, including arthropod ectoparasite infestations, poor farm management, poor awareness of farmers and poor animal health extension services, may all hamper the productivity of the livestock sector. Stopping or reducing these negating factors requires an investigation of the presence and effect of these arthropod ectoparasites on livestock productivity. This is urgently needed in order to come up with effective control measures that will reduce their associated social and economic burden (Fuehrer *et al.*, 2012), as well as the risk factors associated with the improper use of inputs like pesticides (acaricides and insecticides) and poor husbandry practices.

Therefore, it is relevant to determine the prevalence rate of these ectoparasites and their effect on livestock productivity in the present study. This will engender well informed decisions to be taken on the most sustainable control measures against these ectoparasites that have the least effect on the environment and non-target organisms including man and natural enemies, especially when synthetic chemicals are used. Ultimately, this will contribute toward increasing production and productivity in the livestock subsector, which will in turn have positive impact on the livelihood of the rural farmer in terms of protein-rich food (particularly for the most vulnerable in society; women and children), cash, savings, fertilizer (organic) and reduced farm drudgery. More importantly, unlike crops, livestock is ready cash to the farmer. To the government, reduced meat and chemical importation and usage will serve as an improvement on the health of the farmers and consumers as well as improve the country's gross domestic product (GDP). The knowledge gained on investigating the prevalence and effect of arthropod ectoparasites on livestock productivity could provide voucher specimen of the arthropod ectoparasites of livestock in Nigeria, and also serves as a benchmark for the development of better control measures.

II. MATERIALS AND METHODS

Profiles of the study areas

Okitipupa is a community and the headquarters of Okitipupa Local Government Area of Ondo State, South-western region of Nigeria. It has a land area of 803 km² and a population of 233,565 at the 2006 census, this place is situated in Ikale, Ondo, Nigeria, its geographical coordinates are latitude DMS 6°30'8.93"North and longitude DMS 4°46'46.25"East. Weather: 29°C, Wind SW at 10 km/h, 75% Humidity. The latitude for Okitipupa, Nigeria is 6.502481 and the longitude is 4.779515 (figure 3.1)

Study period and study population and survey design

A total of one hundred (80) goats having age ranged from 7 days to 3 years were examined randomly for a period of two months starting from September, 2021 to November, 2021. Goat of different breeds such as Sahelian Goats, Maradi or Red Sokoto, West African Dwarfs and Indigenous goats were examined under this study as target animals.

Screening and Collection of Tick

Sampling Method

The study animals (both male and female) were screened for ticks using standard techniques (Hall, 2006). The survey was carried out weekly from September to November, 2021 in the market.

Physical Screening and Visual Inspection

Physical screening and visual inspection of the head, neck/dewlap, abdomen, trunk, legs, tail, pelvic and wings were performed to search for ectoparasites, Forceps were used to pick out ticks from hidden parts of the body.

Hand-picking

With the aid of light surgical gloves, the ectoparasites were hand-picked by systematically searching the various body regions of the study animals. Ectoparasites obtained from the different animals, as well as the different body regions were kept separately in 70% alcohol in labelled collecting tubes for identification and counting.

Brushing

With this method, each study animal was placed on a piece (about 2 yards) of white calico and the ectoparasites systematically brushed off the feathers (for domestic fowls) and hair (for goats) unto the calico. The ectoparasites were recovered from the calico by dipping the finger into 70% alcohol and tapping gently with the finger. The ectoparasites were then detached into labelled collecting tubes. Macroparasites which fell on the white calico were easily hand-picked into the collecting tubes. Ectoparasites from the different animals, as well as the different body regions were kept separately for identification and counting in the laboratory. The study animals were also examined for their general condition. Signs of ill-health due possibly to parasite infestation were recorded.

Examination of goats

Following an extensive record of anamnesis, the goats were examined for the collection of ectoparasites and detection of clinical manifestations (dandruff, hypothyricosis, alopecia, hyperkeratosis, abnormal pigmentation, desquamation and ulceration) relevant to ectoparasitic infestation, the selected goats were thoroughly investigated by close inspection, digital palpation and parting the hairs. The sites of infestation on the animal body also recorded.

Preservation of ticks

To collect ticks, skin scrapings samples from the affected areas were collected and examined under compound light microscope after adding 10% potassium hydroxide (10% KOH) (Hendrix and Robinson, 2006). Ticks were preserved in 70% alcohol in clean, well-stopper plastic containers (Urqhart *et al.*, 1996) for further gross and microscopic assessment. Temporary slides were prepared for species identification.

Ectoparasites were identified according to the keys and descriptions given by Ferris (1951), Roberts (1952), Hoogstraal (1956) and Soulsby (1982).

Identification of Tick

The adult ticks used in the morphological study were examined by naked eye and with the help of compound light microscope (4X) and (10X) and each morphological character was measured and recorded. For microscopic examination tick and lice were digested by 10% KOH for 20 min (Bowman, 1999). The samples were processed in Biological Science laboratory of Ondo State University Science and Technology, Okitipupa.

Statistical analysis

Data found in this study was first stored in Microsoft excel (Microsoft Corporation). Pearson's chi-square test (χ^2) were used to analyze the data collected and differences were considered as significant when $p < 0.05$. The variables mentioned in this study were quantitative and qualitative.

Figure 1: Map of the studying area in Okitipupa



III. RESULTS

Overall prevalence and mean intensity of ticks in goats.

A total 80 goats were examined in Okitipupa main market and it was revealed the goats were infested with one or more tick species. Three different genera of tick (*Haemophysalis*, *Rhipicephalus* and *Boophilus*) were identified. The main predilection sites of ticks were neck, head, back, leg and abdomen (Table 1).

Sex related prevalence of tick in goats

From the study, it was found that there is no association between sex and tick infestation, although infestation was insignificantly higher in female (46.55%) than in male (40.50%) (Table 2).

Distribution of ticks according to the predilection sites in goats

Result from (table 3) shows a significant association between the predilection sites and ticks infestation with overall total of 111 ticks recovered (Table 3).

Table 1: Prevalence of tick of goats from Okitipupa main market

Ectoparasite	Number examined	Number infected	Prevalence	Total number of Tick recovered	Mean intensity
Tick spp.	80	35	43.75	111	3.17

Table 2: Prevalence of ticks in relation to sex of goats from Okitipupa main market

Sex	Number examined	Number of infected	Prevalence	χ^2	P Value
Female	43	20	46.5	0.2169	>0.05
Male	37	15	40.5		
Total	80	35	43.75		

Table 3: Prevalence of ticks in relation to predilection sites

Animal	Total no of Tick recovered	Predilection sites					Total	χ^2	P value
		Head	Neck	Back	Leg	Abdomen			
							30.84	0.0474	< 0.05
Goats	111	33	9	13	17	39			



Plate 1: Dorsal views of Female *Amblyomma variegatum*



Plate 2: Dorsal views of Male *Amblyomma variegatum*

IV. DISCUSSION

The present study reported a higher prevalence of tick infestation in goat is which is similar to Elsaid *et al.* (2013) Sarkar (2007) found 72.8% of Black Bengal goats are parasitized with ectoparasites. Rahman and Mondal (1985) reported the prevalence 74% in case of *H. bispinosa* and 1.7% in case of *B. microplus* infestation in goats. In the same vein, higher prevalence has been reported by Roy *et al.* (2000) who estimated 55.4% tick infestation in goats.

Favourable climatic conditions, backward level of management, poor level of consciousness and awareness of farmers, and weak animal health extension services are believed to have contributed for widespread distribution and occurrences of ectoparasites (Mulugeta *et al.*, 2010). In this study, tick species were found to prefer the udder, thigh and groin area as favourable sites of attachment compared to the head and neck area. The preference for attachment sites on the host might be due to easiness for the ticks to acquire blood meal faster and factors like temperature and skin thickness of the animals where they get attached to. In agreement to this study, Basu (1993) and Opara *et al.* (2005) attributed tick attachment to host temperature variation, ease of penetration by the hypostome, accessibility of blood vessels in different parts of the body describing these factors as important determinants. These findings are in line with the study carried out at Bislam by Opara *et al.* (2005) who reported that the inguinal region, udder and thigh were the most predominant sites of attachment.

Poor management and poor level of awareness of most of the small ruminant owners on the effect of ectoparasites are strongly believed to have contributed to the widespread occurrence of the infestation (Mulugeta *et al.*, 2010). The differences between the results of present and earlier study might be due to short duration, variation in the geographical locations, climatic conditions of the experimental area, methods of study, selection of sample, breed of animal used and season. The control of ticks is the greatest problems facing farm animal production in Nigeria currently. Accurate diagnoses of the type of ticks that are infesting the farm animals with an understanding of the period of proliferation are essential for cost-effective control. Arthropod ectoparasites of farm animals are quite abundant in nature affecting the day to-day activity and health status of animals and at the same time a jeopardy to food security (Olabode *et al.*, 2010).

Out of 80 examined animals from Okitipupa, 35(43.75%) were infested with ticks. A total of 111 ticks were isolated from the ruminants examined, out of which *Amblyomma variegatum* were the most predominant hard tick species identified in the study area. This finding is in agreement with the report of Opara *et al.* (2005) who worked on livestock in Sokoto municipal, Nigeria as well as Yacob *et al.* (2008). His study showed that more than half of the farm animals were infested and the impact is great on animal production. The result is in agreement with Sohrabi *et al.* (2013) who reported

the frequency of Ixodid tick infestation conducted on domestic ruminant in Kermanshah, Iran. The finding of this study is in agreement with the report of Dipeolu (1975) who report that *Amblyomma variegatum* was the most abundant ticks parasitizing goat in Nigeria. Infestation rates were seen to be higher in female animals than in their male counterparts with no significant.

V. CONCLUSION

Result revealed a higher number of infested goats with Tick spp. This study quantifies the level of tick infestation in goats which demands immediate control program and more intensive epidemiological study for detail identification of the constraints of goat health and production and will seek for remedies. It is recommended that livestock owners, sellers and keepers in this area have to be properly enlightened on various precautionary measures, including physical, chemical, quarantine methods, which ensure that ectoparasites (tick) are, as much as possible, kept away from non-infested animals. Good sanitation habits must be ensured at all times. The veterinary personnel from Ministry and Agricultural agencies in both State, Local government and the veterinary technicians at the grassroots level need to be mobilized to implement mass treatment programs for urgent action which need to be repeated regularly with simultaneous awareness creation to the owners, sellers and keepers.

Considering the importance of meat, skin and hide as a source of income, the high prevalence of tick infestation that is observed in the study area deserves serious attention in order to minimize the spread of infestation and improve on the health of the animals. This survey confirms the endemicity of ticks and their associated diseases with their negative impact on the ruminants. Therefore, the control of these ticks' species is paramount if productivity of livestock is to be enhanced on the farm.

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