ABSTRACT

Infestation of domestic animals with ticks constitutes both a major health and economic problem in livestock production. The study was conducted to identify the species of ticks infesting domestic animals such as cattle, sheep and goats in Mubi cattle market, Adamawa State. Ten (10) each of cattle, sheep and goat were randomly selected at Mubi Cattle Market at every collection date, and were examined for tick infestation. Ticks were collected from different predilection sites. Ticks collected were transferred to Safe-Lock Eppendorf tubes containing 70% ethanol. The specimens were identified to species level using hand lens and dissecting microscope. A total of 232 adult ticks (17 male, 215 females) were collected. 8 species of ticks were identified across three genera namely *Rhipicephalus microplus* (79.74%) was the most prevalent, followed by *Rhipicephalus decoloratus* (9.05%), *Amblyomma variegatum* (4.31%), *Rhipicephalus simus* (3.02%), *Hyalomma dromedarii* (2.16%), *Amblyomma habraeum* and *Rhipicephalus appendiculatus* (0.86%), respectively, and the least was *Hyalomma truncatum* (0.43%). Cattle were the most heavily infested (44.8%), followed by sheep (33.6%) and goat (21.6%). The study revealed that livestock in Mubi were infested by varieties of ticks especially *Rhipicephalus microplus* which was the highest and found on all the animals examined.

**Keywords:** Cattle, Goat, Sheep, Ticks.

I. INTRODUCTION

Ticks are obligate ectoparasites of variety of vertebrates and are distributed worldwide [1]. Ticks are grouped in to three families, of which two genera are of economic importance to domestic animals. The family Argasidae is made of the genera *Argas* (*Ornithodoros*, and *Otothius*) known as the soft ticks because their outer body surfaces lack hard plates [2]. The family Ixodidae known as the hard ticks contains 14 genera namely *Amblyomma*, *Dermacentor*, *Haemaphysalis*, *Hyalomma*, *Ixodes*, *Margaropus*, and *Rhipicephalus*. Also, the important boophilid ticks, formerly of the genus *Boophilus*, are now classified as a subgenus within the genus *Rhipicephalus* [3].

In Nigeria, livestock population was estimated at 34.5 million goats, 22.1 million sheep and 13.9 million cattle populations [4]. Of the 13.9 million heads of cattle, about 11.5 million were found in pastoral systems, while the remaining 2.4 million were found in villages [4]. However, the production and productivity have been hugely affected by low or poor husbandry practices, inadequate feed supply and disease constraints particularly ectoparasite infestations, thereby limiting the protein supply by the livestock [5]. Ticks remain one of the most economically important parasites of domestic animals in tropical and subtropical countries [2].

The warm climate in the tropical and subtropical countries is of enormous importance to ticks of domestic animals, as it enables them to flourish [1]. Also, the large populations of wild animals in warm countries provide a reservoir of ticks and infective microbes that spread to domestic animals [2]. The medical and economic importance of ticks has been recognized worldwide and their ability to transmit diseases to humans and animals.
This is attributed to their blood feeding habit [3, 6]. Tick infestation in cattle can cause anaemia, stress, reduction in weight gain and milk yields, depreciation of hide value, hypersensitivity, toxocosis and predispose animals to secondary infections [7]. According to Kumar et al. [8], cattle that graze in pastures and forest, are exposed to infestation by varieties of ticks. More than 80% of the world domestic animal population is infested with ticks which cause harm to animals through blood loss, general stress and irritation, suppression of immune function, damages to hides and skins [1]. Although, economic losses due to ticks are mainly due to the diseases which they transmit, financial losses associated with nagging irritation and depreciation of the value of skins and hides (up to 20–30%) are also significant [4]. It has been observed however, that animal, infected with ticks reduce their feed intake compare to animal, not exposed to ticks [9]. These effect cause losses of several billions of dollars in the global livestock economy. The losses due to ticks and tick-borne diseases around the globe were put at US$ 13.9 to US$ 18.7 billion annually [2]. Therefore, the high losses due to disease, damage to the skin and death of animals as a result of tick infestation on domestic animals necessitate the need for this study. Identification of the types of ticks infesting domestic animals could contribute a vital role in designing cost effective control measures for the ticks.

II. MATERIALS AND METHODS

A. Study Area

Mubi in Adamawa State, Nigeria. is located on latitude 10.27’ N and longitude 13.27’ E, situated at 592 meters above sea level. It has tropical climate located within the Sudan savanna zone. It has average temperature of about 32°C, with a minimum of 15.2°C between December and January. The area has an average relative humidity of 28 to 45% and annual rainfall of about 1050 mm. The rainy season is between May to October, while the dry season is between November to April [10].

B. Selection of Domestic Animals for Tick Collection

Animals used for the study were Cattle, Sheep and Goat. Ten (10) each of three selected animals were randomly selected at Mubi Cattle Market at every collection date, and were examined for tick infestation. Sample collections were performed four (4) times, between October and November, 2019 at two (2) weeks interval.

C. Collection and Preservation of Ticks

The informed consent of the animal owners was first obtained before inspection and collection from each of the selected animal. The predilection sites examined for ticks were, ears, brisket (dewlap in the case of cattle); withers; knees; and udder in the case of females, and testes in males along with the perineum region; and tail. Ticks were collected from predilection sites using a forceps, hand glove, beaker and dissecting tray. A blunt steel forceps were used for large sized ticks. Collected ticks were transferred to Safe-Lock Eppendorf tubes containing 70% ethanol. Each specimen bottle was assigned a reference identification number for each animal. Information regarding each specimen and host related factors such as gender were noted and recorded on predesigned form.

D. Identification of Ticks

Tick samples were transported to the Zoology Laboratory, Adamawa State University for morphological identification. The specimens were identified to species level using a hand lens and dissecting microscope, with the aid of identification keys described by Walker et al. [11].

E. Data Analysis

Data generated were subjected to descriptive statistics such as percentages, table format to explain the incidence of tick distribution on domestic animals in the study area.

III. RESULTS

If a total of 232 adult ticks (17 male, 215 females) were collected (Table 1) from 3 genera of ticks (Amblyomma, Hyalomma and Rhipicephalus). 8 species of ticks were identified namely, Rhipicephalus microplus, Amblyomma variegatum, Rhipicephalus simus, Amblyomma hebraeum, Hyalomma dromedarii and Rhipicephalus decoloratus. Rhipicephalus microplus was the most prevalent species (79.74%), followed by Rhipicephalus decoloratus (9.05%), and the least was Hyalomma truncatum (0.43%).

All the species of ticks identified were found on sheep (Table 2). The results showed that Rhipicephalus microplus (70.51%) was the most reoccurring ticks on sheep in Mubi, followed by Amblyomma variegatum and Rhipicephalus simus with 07(8.97%) . Male ticks of Amblyomma hebraeum, Hyalomma dromedarii and Rhipicephalus decoloratus were not recorded on sheep in Mubi. However, majority (88.46%) of the ticks found on sheep was females and few (11.54%) were males.

Three (3) species of ticks were identified on goats namely, Rhipicephalus microplus (68.0%), Rhipicephalus decoloratus (28.0%) and Amblyomma variegatum (4.0%). The female were also dominant (92.00%) compared to male (8.00%), as shown in Table 3.

In Table 4, Showed 6 different species of ticks were recorded on cattle in Mubi. Rhipicephalus microplus exhibited high preponderance (92.31%). No male ticks of Hyalomma dromedarii, Rhipicephalus appendiculatus and Amblyomma variegatum were recorded in cattle in Mubi. However, majority of the ticks found on cattle were females (96.16%) with few males (3.85%).

Table 5, shows the distribution of different species of ticks on cattle, sheep and goat in Mubi. The results revealed the absence of Amblyomma hebraeum and Rhipicephalus simus species on both Cattle and goat. Meanwhile, Amblyomma variegatum, Rhipicephalus decoloratus and Rhipicephalus microplus were found on all the domestic animals examined, but Rhipicephalus microplus was higher with 185 (79.74%) of the total population..

TABLE 1: Cumulative counts, number of males and females, and male: female ratio of ticks identified in Mubi.

| Species of ticks          | Total (%) | Males  | Females | Male: Female Ratio |
|--------------------------|-----------|--------|---------|-------------------|
| Amblyomma hebraeum       | 2 (0.86)  | 0      | 2       | 0.2               |
| Amblyomma variegatum     | 10 (4.31) | 7      | 3       | 2.3:1             |
| Hyalomma dromedarii      | 5 (2.16)  | 0      | 5       | 0.5               |
| Hyalomma truncatum       | 1 (0.43)  | 1      | 0       | 1:0               |
| Rhipicephalus appendiculatus | 2 (0.86) | 1      | 1       | 1:1               |

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The prevalence of ticks and their distribution on domestic animals heavily depends on some abiotic factors such as temperature, rainfall, relative humidity, as well as vegetation [12]. This study was conducted to assess species of ticks infesting some domestic animals in Mubi Cattle Market in Adamawa State, Nigeria.

The species of ticks identified were: *Amblyomma hebraeum* (Koch, 1844); *Amblyomma variegatum* (Fabricius, 1794); *Hylomma dromedarii* (Koch, 1844); *Hylomma truncatum* (Koch, 1844); *Rhipicephalus appendiculatus* (Neumann, 1901); *Rhipicephalus (Boophilus) decoloratus* (Koch, 1844); *Rhipicephalus (Boophilus) microplus* (Canestrini, 1888) and *Rhipicephalus simus* (Koch, 1844).

*Amblyomma variegatum and Hylomma species* have long mouthpart, and because of the possession of long mouthpart, they can inflict serious skin damage to their hosts, especially cattle, and may seriously hinder the sucking of calves [13, 14]. Damage can occur without any pathogen or parasite being transmitted by the ticks [11]. *Rhipicephalus microplus* was the most prevalent tick species, which was found on all the domestic animals examined (79.74%). This finding is in tandem with that of Irsaid et al. [15] who recorded same in Pakistan, where there was a clear abundance of *R. microplus* on sheep and goats. The distribution and abundance of *R. microplus* within a geographical range is associated with water retention capacity of the soil as well as high relative humidity [16]. This could be the reason for the preponderance of *R. microplus* in Mubi. This is because Mubi is characterized by high relative humidity [10]. In addition to that *Rhipicephalus microplus* has been associated with the transmission of protozoans, *Babesia bovis and Babesia bigemina*, causing babesiosis in cattle, as well as *Anaplasma marginale* causing anaplasmosis [11]. This shows that most domestic animals in Mubi are at the high risk of contracting this tick borne infection.

*Rhipicephalus decoloratus*, is the second most prevalent species of ticks in Mubi (9.05%), and are mostly found on goats (66.7%). However, *R. decoloratus* was reported as the least prevalent species of ticks, when compared to study by Qadeer et al. [17].

Although cattle are the main host of adult *Amblyomma hebraeum* and *Rhipicephalus simus* [11], both were not found the cattle and goat in Mubi (Table 5). This could be as a result of their characteristics being three-host ticks; where for *R. simus* during the summer, adults are present on large hosts, larvae on rodents in autumn and winter, and nymphs on rodents in winter and spring [11]. *Amblyomma hebraeum* adults are hunters, and they only scuttled along the ground when a suitable host is in the vicinity [11].

*Amblyomma variegatum* which was recently reported in Adamawa State infesting both sedentary and trade cattle [17], have been recorded in this study along with *R. decoloratus* and *R. microplus* infesting all the domestic animals examined. This could be as result of the species abundance during the period of sampling, as adult *Amblyomma variegatum* are most abundant between October and February [11]. *Amblyomma variegatum* transmits *Ehrlichia ruminantium* [18] and *Dermotophilus congoensis* [19], the causative agent of heartwater and dermatophilosis respectively in Nigeria. *Amblyomma variegatum* has also been incriminated in Nigeria as a vector of *Theileria mutans* [20] and *Theileria velifera* [21].

### IV. DISCUSSION

The prevalence of ticks and their distribution on domestic animals heavily depends on some abiotic factors such as temperature, rainfall, relative humidity, as well as vegetation [12]. This study was conducted to assess species of ticks infesting some domestic animals in Mubi Cattle Market in Adamawa State, Nigeria.

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**Ba. bigemina**, in domestic animals in Mubi. And so, control of ticks should be heavily prioritized especially by the cattle rustlers in Mubi.

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