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PREVALENCE OF TICKS AND TICK-BORNE BLOOD PARASITES OF CATTLE IN SELECTED FARMS IN MIRIGAMA VETERINARY RANGE IN SRI LANKA

W.P.S.N. Wijeweera, H.C.E. Wegiriya and K.A.M. Sudarshani
Department of Zoology, University of Ruhuna, Matara, Sri Lanka
E-mail: hemantha@zoo.ruh.ac.lk

Abstract: Ticks and tick borne blood parasitic infections are a major problem in livestock management. These infections results weight losses, reduction in growth and dairy production, high cost of drugs and veterinary care. The present study was carried out for the identification and prevalence of ticks and tick borne blood parasites on 41cattle of Jersey and 38 cattle of Friesian breeds and their effect on physiological state of the cattle in three locations namely Kahambiliyawaththa, Malingamuwa and Ullalapola in Mirigama area of Gampaha district in Sri Lanka.The collected tick samples were preserved in 70% alcohol and were examined under dissecting microscope and identified using a taxonomicpictorialkey. In both breeds abundant tick species (100%) was a hard tick belongs to genus *Boophilus*. Tick abundance was higher in poorly managed Kahambiliyawaththa farm. *Theileria sp.* was the most common tick borne blood parasite (48.1%) found in all three study sites and *Babesiabigemina* and *Ehrlichiabovis* were also recorded. Although pregnant and milking stages of cattle are known to be susceptible for more parasitic infestations, that relationship was not significant among the studied cattle. Further, the severity of the tick infection on the body of cattle does not reflect the extent of the infection of tick borne blood parasites in the host. Findings of the present study indicate the importance of proper farm management to minimize the tick infestations of dairy cattle to prevent blood loss, spreading of tick borne blood parasites and enhance the productivity of dairy cattle.
Keywords: Ticks, tick- borne blood parasites, cattle, parasitic infections.

Introduction

In Sri Lanka cattle and buffalo have played key roles in dairy industry by providing milk and curd and also in rural subsistence agriculture for ploughing, puddling, harrowing lands and for threshing paddy [1]. The majority of cattle in the country are of the crossbred type such as Sindhi, Sahiwal, Friesian and Jersey [12]. Mainly intensive system cattle farming is practiced in up-country, with permanent housing and feeding with concentrates [8]. At present level of milk production of local cattle and buffalo is estimated to meet only about 30% of the total market share with the country [12].

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Major challenges for milk production are poor management practices, lack of advanced breeding methods, supplement of low quality food, lack of government support, low economy of farmers and diseases. Among diseases ecto or endoparasitic infections are very important and their effects are usually characterized by lower outputs of animal products and byproducts [14]. Among ecto-parasites, ticks play an important role [15].Their attachment to the host causes irritation of the skin, with subsequent ulceration and sometimes secondary bacterial infections. Heavy infestations of ticks can result in anaemia, restlessness of host and significant loss of weight [10].

In addition ticks also act as vectors of internal blood parasites. Tick borneinternal parasites lead to reductions in milk production, weaning weights, pregnancy rates in mature cows, feed intake, feed efficiency and immune suppression [18]. The major losses are caused by protozoan and viral pathogens transmitted by ticks [15]. Major tick-borne protozoan diseases are Theileriosis and Babesiosis and Anaplasmosis which cause severe health problems in cattle [15].

Babesiosisis caused by intra-erythrocyticprotozoanparasites of the genus *Babesia.* These organisms are transmitted by ticks of *Boophilusmicroplus, B.annulatus, B.decoloratus* and *Rhipicephaluseverts* [2]. *Theileria* species cause tropical theileriosis and East Coast fever [3]. Anoplasmosis is caused by *Anaplasmamarginale*. *Boophilusspp., Dermacentorspp., Rhipicephalusspp* and *Hyalommaspp.* are the vectors of anaplasmosis [5].

Effective control of tick borne diseases is best achieved through a combination of tick control and immunization programs. Tick control is still based mainly on the use of acaricides, compared to the other alternative, non-chemicaltick control methods such as use of predators and parasites of ticks, pasture spelling and tick-resistant cattle [10].

Materials and methods

The study was carried out in three sites of Mirigama areas in Gampaha district namely; Kahambiliyawaththa farm (a free range farming system), Malingamuwa farm (a semi intensive farming system) and Ullalapola farm (an intensive farming system). Females of Jersey and Friesian (83 individuals) breeds were selected for the study.

The data was gathered by visiting each dairy farm. Background information about cattle and farm was collected from the farmers using a questionnaire. The tick samples were collected directly from regions of tail, perineal region, ear and dewlap using thumb forceps [4]. Different kind of male and female ticks were collected from each farm. The collected tick samples were preserved in 70% alcohol solution [4].

Blood samples were taken using a needle, from the tail tip of each cattle in selected farms. A drop of blood (the blood sample) was taken on a clean slide, spread by another slide at an acute angle, air dried and fixed in absolute methanol. One smear per cattle was prepared.

Tick infestation was estimated by counting the number of ticks on the body of randomly selected 10 cattle in each farm used for this study. Tick counts were done considering all the ticks in 5 square centimeter area of perineal region just below 15 cm from the beginning of the tail.

In the laboratory, each tick specimen was examined under dissecting microscope and identified using a tax on omicpictorial key of ticks [13]. The blood smears were stained in Leishmann stain [11] and dried smears per each cattle were observed under oil immersion at high magnification (10X100) of light microscope for blood parasites that are known to be transmitted by ticks. Observed blood parasite species were identified by referring Handbook on animal diseases in the tropics [17].Percentage prevalence of parasites was calculated.

Results and discussion

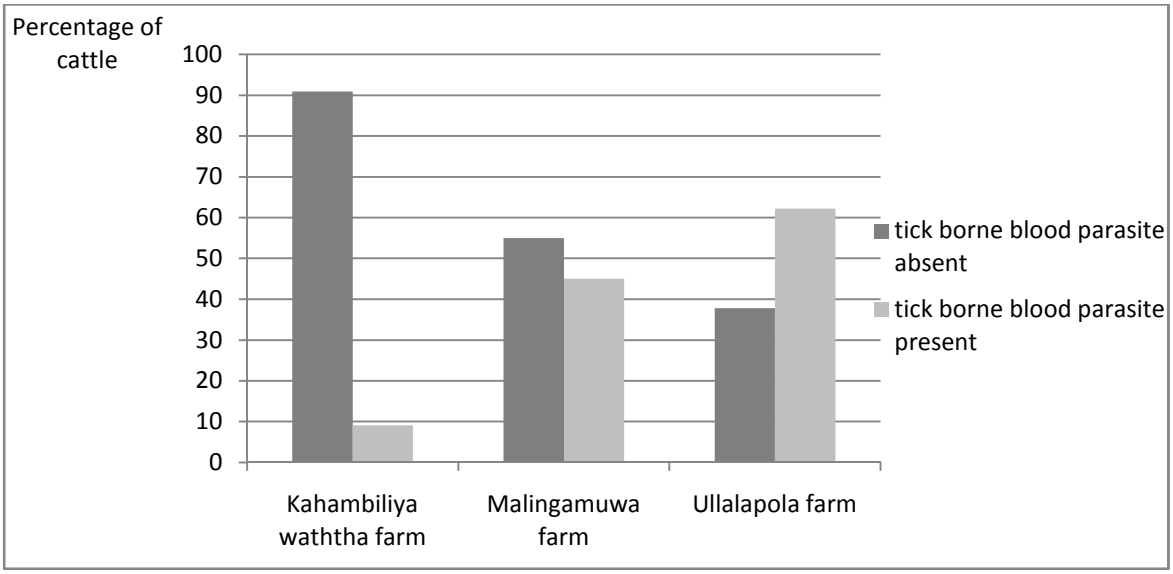
100% of the observed cattle were found to be infested with hard ticks. No soft ticks were recorded. *Boophilus sp*. was the recorded tick species.

10 cattle (5 of Jersey and 5 of Friesian) of each farm were randomly selected, in order to count ticks. Presence of ticks on 5cm^{2}area of the perineal region of randomly selected cattle was counted and mean value of tick count for each farm was calculated. The mean values were ranked as High (H), Moderate (M) and Low (L). These scores were given according to the number of ticks that were present in 5 square centimeter of perineal region of cattle (<5 low, 5–15 moderate, > 15 high). High abundance of ticks was recorded in Kahambiliyawaththa farm (free range farming system). Malingamuwa (semi intensive farming system) and Ullalapola farm (intensive farming system) had moderate and low tick abundance respectively (Table 1).

Table 1. Abundance of ticks in studied cattle reared in three selected farms.

Name of the farm	No. of ticks	Mean value ± SE	Rank according to the abundance of ticks
Kahambiliyawaththa	422	42.2 ± 4.54	High
Malingamuwa	138	13.8 ± 0.952	Moderate
Ullalapola	36	3.6 ± 0.581	Low

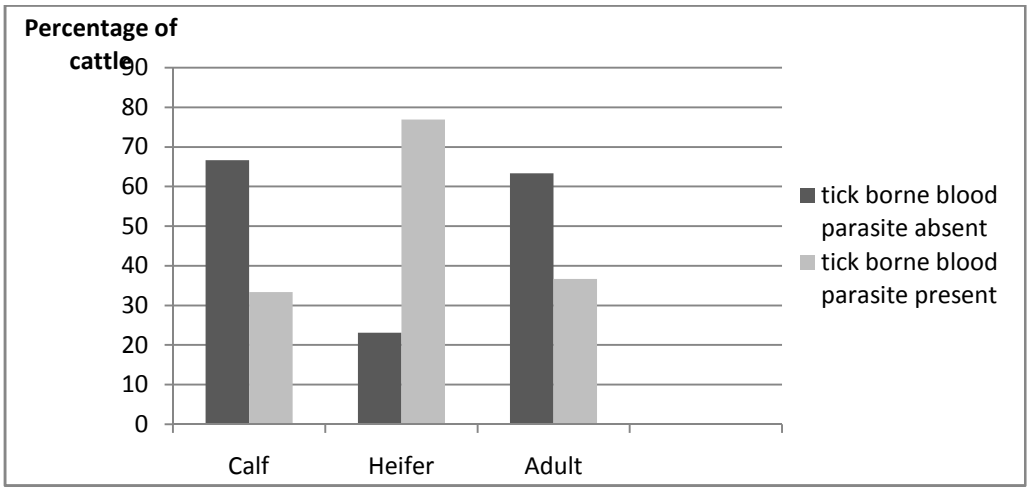
Considering the percentage of tick borne blood parasitic infection in cattle of the study area, the highest percentage (91%) of cattle without the tick borne blood parasites were found in Kahambiliyawaththa farm, where farmers rarely apply control measures (acaricides) for tick infection. Although tick infection is common tick- borne internal blood parasites are less in cattle of this farm. It might be due to the disease resistance that occurs naturally in the cattle. On the other hand, Ullalapola farm had the lowest tick abundance but higher percentage (62%) of cattle of this farm had tick borne blood parasites. In this farm, cattle lived in a limited space and that might enhance their susceptibility to tick borne blood parasitic infections. Analysis of data indicated that, there is a significant (X^2=15.893, p =0.000) difference in the presence of tick borne blood parasite in cattle studied farms (Fig 1).



Bloodsmear examination revealed the presence of three tick borne blood parasites, namely *Theileriasp*., *Ehrlichiabovis* and *Babesiabigemina* in studied cattle.

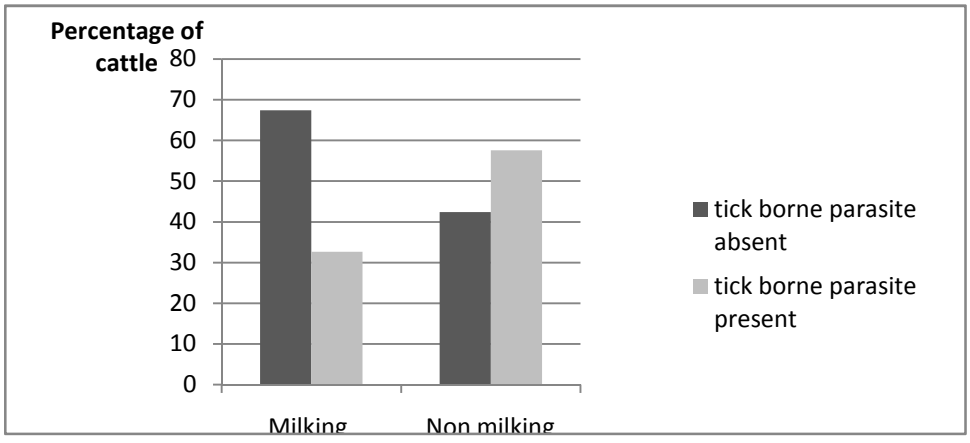
The percentage of tick borne blood parasites infection in Jersey breedwas 35.71 % while 51.35% in Friesian breed. There was no significant (X^2 = 1.962, p= 0.161) difference in the prevalence of tick borne blood parasites between cattle breeds in study farms indicating that both breeds were more or less equally susceptible for tick borne parasitic infections.

Higher percentage of heifers (1-2 years old) had tick borne blood parasites than adults (more than 2 years old) and calves(less than 1year old). According to the results, there is a significant (X^2 = 7.313, p = 0.026) difference between tick borne blood parasitic infection in 3 age groups of cattle in studied farms (Fig 2).



In general, younger animals are more likely to show signs of parasitism [6]. When they mature their immune response strengthens and adult cattle generally acquire immunity to most of the endo-parasites except liver fluke [19]. It might be the reason that adults were less susceptible for the infection. Antibodies passes from mother to calf via the colostrum (first milk after calving) provide passive immunity for the calf [7]. Passive immunity gives temporary protection by transfer of certain immune substances from resistant individuals [16]. As a result calves might be less susceptible to the infection.

Significant relationship (X^2 = 4.886, p= 0.027) between presence of tick borne blood parasites and their milking status was observed in a higher percentage (57.58%) of cattle in non-milking (dry) stage, which also include heifers were infected with tick borne blood parasites (Fig 3).



Most of the time farmers do not think that dry cattle will be a resource in near futureas such they do not pay much attention on dry cattle, especially about their nutrition, medication and

sanitation. It might be areas on that non milking cattle had more tick borne blood parasites than that in milking cattle.

According to the findings of the study presence of ticks may not be an effective indicator for the presence of tick borne blood parasites in any cattle as 57% of cattle which had tick parasites did not have any tick borne blood parasite. On the other hand, all the cattle infected with tick borne blood parasites had some level (low, medium or high) of tick infestation (Fig 4). Further studies are required to confirm the tick species which are responsible for the transmission of tick borne blood parasites in cattle.

Each selected cattle in the study population had been examined for tick borne parasitic infection. Presence of tick borne parasites in the study area was most likely attributed to the production system, management practices used and the environmental conditions in the area. In Kahambiliyawaththa, where free range cattle management was practiced had good vegetation cover and that might provide good habitats for ticks.

According to the Fig.4, 43% of cattle had tick borne blood parasites. Among them 38% had only one tick borne blood parasite namely *Theileria sp.,* or *E.bovis* or *B.bigeminia* and 5% of cattle had two tick borne blood parasites (*Theileria sp*. and *E.bovis*).

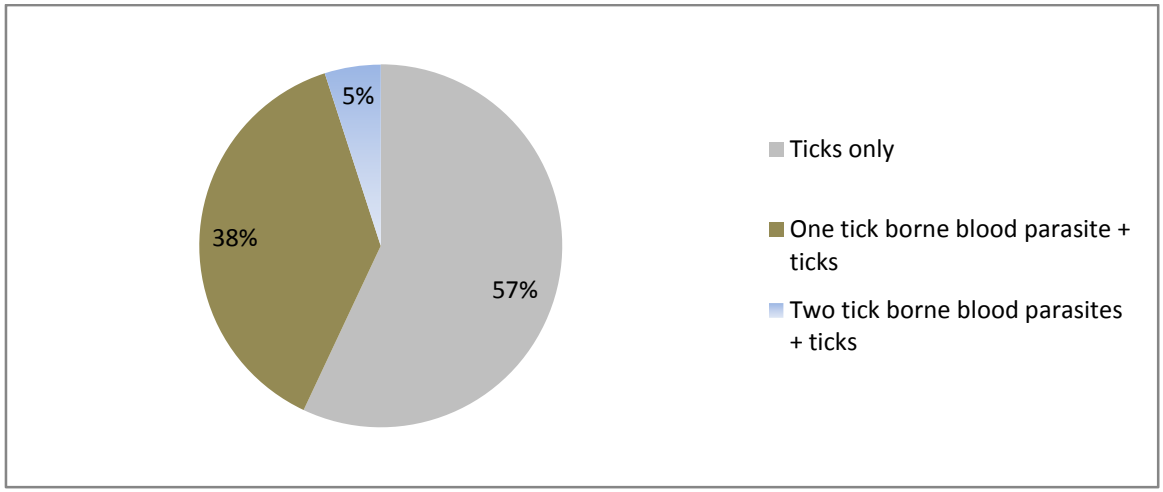


Fig 4. Percentage abundance of Ticks and tick borne parasites in studied cattle.

Tick borne internal parasites can cause significant production losses in cattle, resulting in substantial economic losses for owners. Often, presences of parasites are subclinical and unnoticed but severe infestations can cause diseases and even death. Reduced milk production, reduced weaning weights, delayed puberty and decreased fertility in replacement heifers, reduced pregnancy rates in mature cows and reduced feed intake are some of the

subclinical production losses caused by internal blood parasites [18]. Necessary steps should be taken in order to control ticks and tick borne blood parasites

The majority of livestock owners of the study sites are rich and educated but they are live in abroad or have no time to concern about their farms. As a solution for that they employ laborers and supervisors. But the efficiency and management of those farms were not at a satisfactory level. It might lead to an indirect result of ticks and tick borne blood parasites. However awareness programmes for dairy farmers, laborers and supervisors will be a good solution in order to minimize the tick infestation and tick borne diseases.

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