

## Prevalence and Identification of Tick Infestation in Bali's Cattle in Badung Regency

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**Abstract.** Tick is an ectoparasite in cattle that economically very important because it can reduce livestock production and productivity. This study aims to determine the prevalence and to identify types of tick in Bali's cattle in Badung Regency. The prevalence of tick in relation to gender and age was studied. A total of 285 cattle was examined, of which, 65 (22.8%) cattle were infected by tick. The female cattle showed higher (25%) tick infestation than male cattle (19.05 %) without significant differences ( $p > 0.05$ ). Prevalence of tick was significantly higher ( $p < 0.05$ ) in old cattle, age above 5 years (33.7%), followed by adult cattle, age of 2 -5 years (20.6%), and the least prevalence in young cattle, age under 2 year (13.3%). Two genus of tick were identified from the study. Among the tick, *Boophilus sp.* 15.17% was the most prevalent tick genus identified, while the rest was *Rhipicephalus sp.* 7.01 %. Favorable predelection sites for tick were ears, mammary gland, back leg and neck of the cattle. This study could help in a better understanding of prevalence of tick patterns and risk factors in cattle population for the implementation of effective control plans.

**Keywords:** Prevalence, Infestation, Tick, Bali's cattle

### I. INTRODUCTION

The prevalence of ectoparasites which infest the cattle in Indonesia almost take place all year round, as Indonesia is one of the tropical countries. The presence of

ectoparasites is increasingly detrimental if not properly controlled [1]. Ticks are ectoparasites in cattle which are economically very detrimental because they can reduce productivity, as a vector of disease and cause of death [2, 3]. Ticks can

act as agents that cause disease in animals, produce poisons or toxic substances, as hosts between protozoa and helminths, as vectors for bacteria, viruses, Spirochaeta, Rickettsia, Chlamydia, and other disease agents [3][4].

Tick infestation results in skin damage, known as dermatosis, thereby reducing skin quality. Tick infestations also cause necrotic tissue in the skin. The pathological changes in the skin are generally caused by mechanical activity and or toxic effects produced by the parasites. The occurrence of abrasive wounds (friction) causes secondary infections by germs and result in inflammation [1]. The impact of tick's bites directly on cattle causes mechanical damage, irritation, swelling, and hypersensitivity. Anemia can occur in a large number of tick's bites that can reduce the production, so controlling the eradication of ticks in the tropics and subtropics country is a major priority [5]. Some species of ticks cause paralysis due to toxins that are released by the parasite [6]. The most economically important ticks in cattle in tropical country are the genus *Hyalomma sp.*, *Boophilus, sp.* *Rhipicephalus sp.* and *Amblyoma sp.* [7].

Several studies on the prevalence of tick infestation in cattle have been reported, 57% in Padang Panjang City [8], 47.6% in Aceh [9] which are infested by *Boophilus sp.*, *Rhipicephalus sp.*, *Amblyoma sp.* and *Hyalomma sp.*, whereas 88.49% in Nigeria [10] and 56.2% and 72.39% in Ethiopia [11][12]. From the description above shows that tick infestation in cattle is a serious problem in cattle farms in tropical country, especially Bali's cattle. Mostly, the handling system of Bali's cattle is still semi-intensive which does not pay much attention to the health management of the cattle. This factor can predispose parasite infestation to the cattle.

## II. MATERIAL AND METHODS

### Sample

The sample used in this research was a tick taken from the Bali cattle's body which were raised in Badung Regency. Ticks that were obtained were then put into a plastic pot. Then, each plastic pot was labeled by number, gender and age of the cattle (calf or adult) so that there was no error in the inspection.

### Sample Selection and Sampling

The target population in this study is Bali's cattle in the Badung Regency area with a total of 285 samples. The number of

samples studied was determined based on the Thrusfield [13] formula. The cattlemen who are the object of research will be visited for sampling ticks. During the visit, data on tick risk infestation factors including gender, age, handling management and the hygiene status of the farm were collected by questionnaire.

### Sample Inspection

Ticks found from selected animal body areas are collected and identified. Ticks were taken manually using tweezers from various areas in the body of the cattle. Ticks were then put in a small plastic pot that already contains 10% formaldehyde cotton and is labeled with the sample code. The ticks specimens that were being taken had to be in intact form, so that it can be easily identified and examined at the Laboratory of Parasitology, Faculty of Veterinary Medicine, Udayana University. The ticks then were identified by putting them on Petri dish and examined under a stereo microscope. Then the genus was identified from the morphology or structure, such as the shield shape, foot color, body, one coxae and the ventral edge [14].

### Data Analysis

Data collected from the field were analyzed descriptively and with the chi-square test ( $\chi^2$ ) to measure the relationship of risk factors with the tick infestation.

## III. RESULTS

The results from 285 of Bali's cattle showed 65 positive infected ticks with a prevalence of 22.8%. Distribution of tick predilections on the body of the cattle were in the head region, especially the ears, at the base of the tail, back and abdomen in the mammary glands for female cattle and the scrotum in male cattle. Based on field observations and from the questionnaire, the handling system of Bali's cattle were mostly with semi-intensive maintenance, treatment of ectoparasites with spraying was found infrequently, and the cattle grazing is at dry soil environment. From this study, we obtained two genus of the ticks, which are genus *Boophilus sp.*, being the most dominant (15.79%) and the rest was *Rhipicephalus sp.* (Table 1).

Table 1. Identification of Ticks in Bali cattle's

Ticks' Genus	Prevalence (%)	Predilection Area
<i>Boophilus sp.</i>	15,79	Ears, base of the tail, back, udder and scrotum
<i>Rhipicephalus sp.</i>	7,01	Ears, base of the tail, back, udder and scrotum

The prevalence of tick infestation based on the gender of cattle is 19.05% in male and 25% in females. There was no significant difference ( $p > 0.05$ ) between the gender and the prevalence of tick infestation (Table 2).

Table 2. Prevalence of Tick Infestation in Bali cattle's based on Gender and Age

Variables	Samples (n)	Positive Cattle (%)	p value
Gender			
Male	105	20/105 (19,05)	0.248
Female	180	45/180 (25)	
Group of Age			
Young (< 2 years old)	90	12/90 (13,3%)	0.003
Adult (2-5 years old)	97	20/97 (20,6%)	
Old (> 5 years old)	98	33/98 (33,7%)	

The prevalence of tick infestation in cattle turns out to be significantly related to the age of cattle ( $p < 0.05$ ), in this case the prevalence of tick infestation in old cattle is 33.7%. It is higher than that of adult age (20%) and lowest at young age (13.3%) (Table 2).

The results of the study showed that the prevalence of tick infestation in Bali's cattle in Badung Regency was 22.8%. The presence of ticks that infest cattle can cause skin disorders resulting in itching and

anemia. Reduction of cattle's weight significantly and cattle's productivity due to tick infestation can result in economic loss [10] and the tick infestation can be a vector of disease and cause death [2]. Ticks can act as a host between protozoa and helminths, and act as vectors for bacteria, viruses, Spirochaeta, Rickettsia, Chlamydia [4]. The prevalence of ticks in this study is lower than that in Bali's cattle in Aceh by 47.6%. The study of several countries found a prevalence of ticks in cattle is 88.49% in

Nigeria [10], 45.25% in Egypt [15] and 35% in Pakistan [16]. Tick infestation in cattle is still a serious problem, so tick's control is needed by taking into account the risk factors. Some risk factors that influence the tick infestation are climate, regional topography, breed, gender, age and handling management [17, 18]. The high prevalence of ticks in Bali's cattle in this study was due to the fact that the handling system of Bali's cattle was generally semi-intensive with inadequate animal health services such as infrequent treatment of tick infestations. Another factor is the climate conditions that are in accordance with the cycle of tick development and the farmer lack of attention to the health of their cattle. Increased tick density in cattle occurs with a temperature of 37°C and 84% relative humidity [19].

The results of the study showed that the prevalence of tick infestation in female cattle (25%) was higher than in males (19.05%). Pregnant and nursing female cattle can reduce sensitivity to infection, this is related to the influence of the hormones prolactin and progesterone. Pregnancy, giving birth and lactation generally causes stress in female cattle that can reduce immunity. [20] In this study there was no significant difference in accordance with what was reported by several researchers

namely in Pakistan with the prevalence of ticks in female cattle (36%) and males (32%) [16] and in Bangladesh, reported the prevalence of ticks in females 59.37% and in males 35.83%. [21] In this study male and female Bali cattle were generally kept in the same cage and herded in same places and conditions.

#### IV. DISCUSSION

Old age Bali's cattle (> 5 years old) have a higher prevalence of tick infestation (33.7%) compared to adult age, 2 - 3 years of age, (20.6%) and young age, <2 years, (13.3%). These results are in accordance with those reported by several researchers [12][16][22]. The higher tick infestation in older cattle compared to young cattle is related to the increasing age of cattle, the chance of exposure to ticks is greater and decreased resistance to the disease. [23]

From this study, we identified two genus of ticks in Bali's cattle, namely *Boophilus sp.* and *Rhipicephalus sp.* with a prevalence of 69.23% and 30.77%, respectively. Other researchers reported several genus in cattle, namely *Boophilus sp.*, *Rhipicephalus sp.*, *Hyaloma sp.* [10][16] and *Amblyomma sp.* [9]. One study with 120 cattle samples from three different breeds in Nigeria found there were four tick species,

namely *Amblyomma variegatum* 27 (22.5%), *Boophilus decoloratus*, 21 (17.5%), *Hyalomma sp* 8 (6.7%) and *Rhipicephalus sanguineus* 4 (3.3%) [24]. The difference in these results is because the study location and the type of cattle. Both of the tick genus are predominantly found in cattle at tropical and sub-tropical regions. Ticks can cause economic losses directly by sucking blood and indirectly as vectors of diseases such as babesiosis and theileriasis [5].

Area of tick predilection in this study were on the head especially the ears, back, base of the tail and the abdomen, in the scrotum or in the udder, which is almost the same from the reports of some researchers, namely in the head, neck, the inside of the thigh, penis, scrotum, vulva [5,16]. The distribution of tick predilections was also reported in the ears, neck, tail, udder, scrotum [25]. The place of tick predilection on a cattle's body depends on the type of tick, the inherent opportunity to suck the blood and generally the predilection is in the hairless or short-hairy part [5] and thin skin that has many blood vessels. [18] Dermatophylosis lesions in cattle can be caused by tick bites with characterized by hair loss and formation of scald especially on the neck, back and abdomen [26].

## V. CONCLUSIONS

The prevalence of tick infestation in Bali's cattle in Badung Regency was 22.8%. Among of which the genus *Boophilus sp* and *Rhipicephalus sp* was identified, with predilection in ears, back, base of the tail, udder and scrotum. There is a relationship between cattle's age and the prevalence of ticks in Bali's cattle.

Management of cattle raising needs to be improved by conducting routine and regular spraying to eradicate the ticks. Further research is needed on the role of ticks as vectors of blood diseases in Bali's cattle.

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