

Endo- and Ectoparasite Infections in Two Cattle Farms Located in Kuala Terengganu, Peninsular Malaysia

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ABSTRACT— *A study was conducted to determine the parasite infection in two cattle farms located in Felda Belara (Farm A) and Kampung Beladai Kolam (Farm B) Kuala Terengganu, Peninsular Malaysia. Twenty cattle from each farm were examined for endo- and ectoparasites. Faecal samples were subjected to worm egg counts for estimation of nematode burden and sedimentation for detection of trematode infection. Blood samples were subjected to thin blood smear to detect the presence of blood parasites and packed cell volume (PCV) technique was used to determine the percentage of red blood cells in whole blood. Besides, external body examination was also conducted for the recovery of ectoparasites. Results showed that Fasciola sp. (95%), Boophilus microplus (86%) and Theileria sp. (98%) were the most common parasites found in the two cattle farms in Kuala Terengganu.*

Keywords— *Endoparasite, ectoparasite, cattle, Malaysia*

1. INTRODUCTION

In 2012, there were 742,558 cattle recorded in Malaysia [1], with 91,226 in Terengganu [2]. The number contributed greatly to the livestock industry in Malaysia. The highest number of cattle in 2012 was recorded in Pahang (113,930) while the lowest was recorded in Wilayah Persekutuan Kuala Lumpur (600).

One of the most common problems for cattle farmers is parasite infection, as it can affect cattle production and productivity. The losses from parasite infection can be significant. In Malaysia the economic losses were estimated due to various causes of parasitism in cattle and buffaloes in Peninsular Malaysia were approximately \$20 million [3]. These losses include mortality, reduced performance in meat and milk yields, treatment cost and also condemnation in abattoirs.

There were few important parasites of cattle in Malaysia, such as trematodes (liver flukes), ectoparasites and blood parasites. Studies on fascioliasis have been conducted in Malaysia. However, there is lack of reports on the infection in Terengganu. As reviewed by [4], a survey in 1972 reported fascioliasis in Kedah, Perak, Selangor, Pahang, Negeri Sembilan, Melaka and Johor with infection limited to certain areas. Most of the reports were on liver condemnation of

cattle at abattoirs due to fascioliasis [5, 6, 7] compared to prevalence of liver flukes in live animals. In Malaysia, *Fasciola* species reported was mainly *Fasciola gigantica*, whereas *F. hepatica* was only found in imported cattle [4].

The tick *Haemaphysalis bispinosa* has been introduced to Malaysia on cattle and also responsible for the transmission of *Babesia bovis* to cattle, *Babesia gibsoni* to dogs and *Babesia motasi* to sheep [8]. Study by World Organization for Animal Health Report revealed that there had been several outbreaks of bovine babesiosis disease in Malaysia since 1996. In 1997, there were 17 reported cases, four in 1998 and 11 in 1999. The number of cases escalated in 2001 where 263 cases were reported [9]. In tropical countries including Malaysia, *Boophilus* sp. was identified as the vectors for *B. bovis* and *B. bigemina*. Based on previous reports by [9, 10], the common vector-borne blood parasites in cattle in Malaysia are *Babesia* spp., *Theileria* spp. and *Anaplasma* spp.

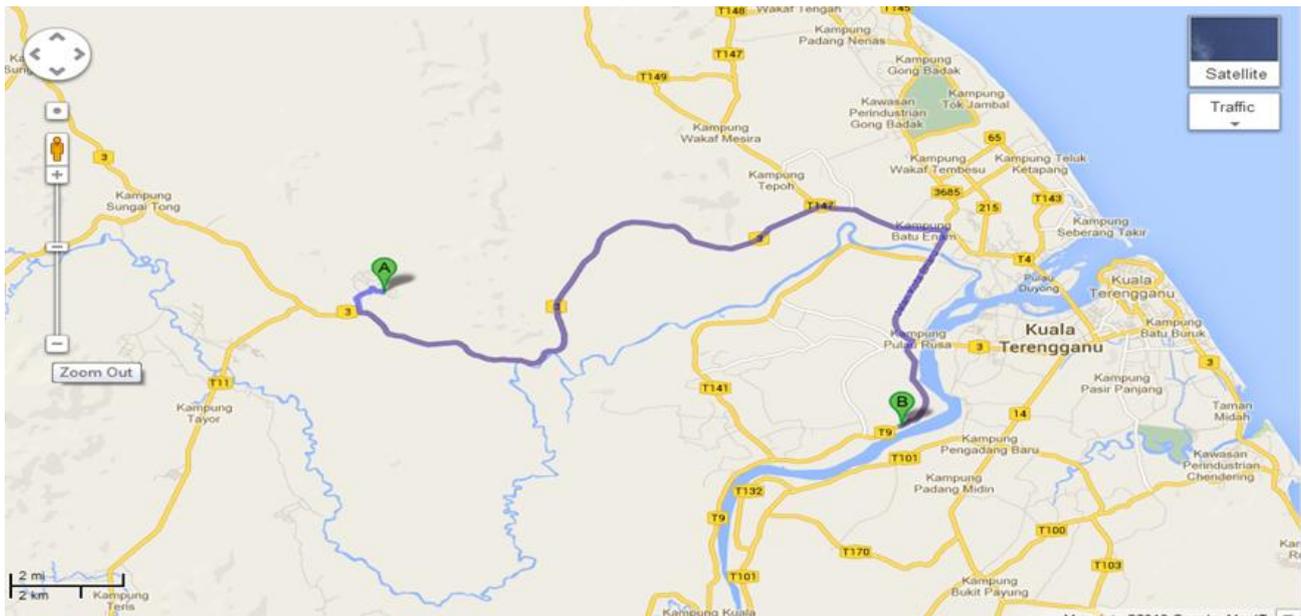
Even though Terengganu reported a high number of cattle as compared to other states in Malaysia, there is a lack of information on the current status of endo- and ectoparasite infection in cattle. Unknown status of parasite infection could lead to prolonged and increased infection which eventually leads to lower production and mortality. Information on parasite infection from this study will be useful to the officers from the Department of Veterinary Services Terengganu and farmers. This information will assist in decision to treat and manage the parasite infection in cattle.

Thus, the objective of this study is to determine the infection of endo- and ectoparasites in two farms located in Felda Belara and Kampung Beladau Kolam located in Kuala Terengganu, Peninsular Malaysia.

2. MATERIALS AND METHODS

2.1 Sampling site

The study was conducted at two cattle farms located in Felda Belara (A) and Kampung Beladau Kolam (B), Kuala Terengganu (Figure 1).



2.2 Animal and information

Twenty cattle in each farm were randomly chosen for this study. On the sampling day, an information sheet was given to the farmers to obtain information such as disease management, grazing management, stocking rate and mortality rate.

2.3 Sample collection

Sampling was conducted in September and October 2012 between 0900 - 1400h.

2.3.1 Faeces

Twenty rectal faecal samples were collected from cattle in each farm. Samples were separately kept in plastic containers and stored at 4°C until examination. The faecal samples were processed for liver fluke detection, nematode egg counts and pooled faecal larval cultures (by farm).

2.3.2 Blood

Blood were taken from the jugular or tail veins of 40 cattle (20 cattle/farm) into vacutainer tubes containing Ethylene-diamine-tetraacetic acid (EDTA) anticoagulant. These tubes were stored at 4°C until processed for blood parasite examination and PCV measurement.

2.3.3 Ectoparasite

Examination of the body and skin were conducted to detect any attached tick and any skin lesion. Live ticks and skin scrapings were collected from the cattle into individual plastic containers and the samples were processed immediately.

2.4 Parasitological and haematological examinations

2.4.1 Gastrointestinal nematodes

Faecal nematode egg counts were conducted to estimate the infection level of nematodes in cattle. The method was conducted according to [12] with the sensitivity of the method is 1 egg counted is equivalent to 100 eggs per gram (e.p.g) of faeces. The result for nematode egg counts was reported in zero or in hundreds,

Larval culture was conducted according to [12] to collect the third stage larvae of the nematodes for identification. Identification was conducted based on the identification keys provided in [12]. The nematode species proportion was recorded in percentage.

2.4.2 Liver flukes

Sedimentation method was conducted according to [13] to detect the presence of liver fluke eggs from faecal samples. The result was recorded as either negative or positive for each animal.

2.4.3. Blood parasite and PCV

Thin blood smear were prepared according to [12] and stained with 8% Giemsa. Presence of parasite in blood sample was noted by colour, orientation and shape. Blood parasites were identified as described by [14].

In order to determine if the animals are dehydrated or anaemic, packed cell volumes (PCV) were conducted on the samples following the method by [15]. The percentage of red blood cell from each sample was compared with the normal range of cattle [15] to determine whether they are anaemic, dehydrated or normal.

2.4.4 Ectoparasite

Examination and sample collection for ticks were conducted according to method by [16]. The observed ticks were identified up to genus level, using the keys by [12, 16].

2.5 Statistical analysis

Statistical analyses were performed using SPSS Version 20 (IBM Corporation). Mann-Whitney U test was performed to compare the mean rank worm egg counts between farm A and farm B. Chi-square analysis was conducted to compare the frequency of tick genus within farms. In the analyses, 95% confidence interval ($p < 0.05$) was set to indicate significance.

3. RESULTS

3.1 Gastrointestinal nematodes

From 37 cattle sampled (three animals had no faeces during sampling), only nine were found positive for nematode (strongyle) eggs. The lowest nematode worm egg counts in both farms were 0 e.p.g., while the highest nematode WEC for both farms were 200 e.p.g. Mean nematode WEC for Farm A was 16.7 ± 12.1 e.p.g. (mean \pm standard error), while for Farm B was 42.1 ± 14 e.p.g, with no significant differences between the two farms ($Z = -1.69$, $p > 0.05$).

There was no third stage larvae obtained from faecal cultures of cattle in Farm A. In Farm B however, *Haemonchus* sp. was identified as the most dominant nematode (52%), followed by *Oesophagostomum* spp. (35%) and *Trichostrongylus* spp. (13%) $\chi^2(2, N=100) = 22.9$, $p < 0.001$.

3.2 Liver flukes

From 37 cattle sampled for liver fluke testing, 35 (95%) were found positive for liver fluke eggs. All cattle in Farm A ($n=18$) were positive for flukes while in Farm B, 17 out of 19 cattle was found positive for liver fluke eggs.

3.3 Blood parasite and PCV

From 40 cattle sampled, 39 (98%) were found positive for *Theileria* sp. infection. In Farm A, 19 out of 20 cattle were found positive for *Theileria* sp., while in Farm B, all 20 cattle (100%) were found to be positive for *Theileria* sp. infection. *Babesia* spp. and *Anaplasma* spp. were not detected in any of the cattle.

PCV values indicated that only two animals were anaemic in Farm A, while in Farm B all cattle have normal PCV values.

3.4 Ectoparasite

A total of 40 cattle were examined for tick infestation in farms A and B. The overall prevalence of tick infestation was 60%. From 20 cattle examined in Farm A, 13 (65%) of the cattle were infested with ticks while in Farm B, 11 (55%) were found to be infested with ticks (Table 1).

Table 1: Prevalence of tick infestation according in farms A and B.

	No of cattle sampled	No. of animals affected	Prevalence
Farm A	20	13	65%
Farm B	20	11	55%

A total of 85 ticks were collected from both farms. All the ticks belonged to the family Ixodidae. The mean tick burden of cattle in Farm A was 2.5 ± 0.46 while for Farm B 1.8 ± 0.39 (Table 2).

Table 2: Mean tick counts per animal \pm standard error (SE) in farms A and B.

	No of ticks collected	Mean tick count/animal \pm SE
Farm A	50	2.5 ± 0.46
Farm B	35	1.8 ± 0.39

Overall three genera of ticks were identified from a total of 50 ticks collected from Farm A (Table 3). *Boophilus* was the most prevalent genera of ticks (80%), followed by *Haemaphysalis* (18%) and *Rhipicephalus* (2%) $\chi^2(2, N=50) = 50.9$, $p < 0.05$. Out of the 35 ticks collected in Farm B (Table 4), the following genera were identified in descending order of prevalence; *Boophilus* (94.3%), and *Rhipicephalus* (5.7%) $\chi^2(1, N=35) = 27.5$, $p < 0.05$.

Table 3: Total tick count according to genera of ticks in farm A

Genera	Total tick counts	Prevalence (%)
<i>Boophilus</i>	40	80
<i>Haemaphysalis</i>	9	18
<i>Rhipicephalus</i>	1	2
Total	50	100

Table 4: Total tick count according to genera of ticks in farm B

Genera	Total tick count	Prevalence (%)
<i>Boophilus</i>	33	94.3
<i>Rhipicephalus</i>	2	5.7
Total	35	100

Ticks were collected from seven body parts namely axial, udder/scrotum, pinna, groin, neck, leg and tail. In both farms, the groin accounted for the highest percentage of tick collected followed by axial with the tail accounting the least. In farm A (Table 5), the groin accounted for the highest percentage (36%), followed by the axial (18%) with the tail accounting with the lowest percentage (4%) $\chi^2(6, N=50) = 23.6, p<0.05$. In farm B, the groin accounted for a percentage of 28.6% followed by axial (20%) and the tail being the least site (5.7%) as shown in Table 6, with $p=0.143$.

Table 5: Predilection site of ticks in farm A

Predilection site	Frequency	Percentage (%)
Axial	9	18
Udder/scrotum	4	8
Pinna	6	12
Groin	18	36
Neck	7	14
Leg	4	8
Tail	2	4
Total	50	100

Table 6: Predilection site of ticks in farm B

Predilection site	Frequency	Percentage (%)
Axial	7	20
Udder/scrotum	3	8.6
Pinna	4	11.4
Groin	10	28.6
Neck	6	17.1
Leg	3	8.6
Tail	2	5.7
Total	35	100

4. DISCUSSION

The present study showed high prevalence of liver flukes and ectoparasites, with low prevalence of gastrointestinal nematodes.

The occurrence of liver flukes in the study is in agreement with [4] who suggested that liver fluke infection is a problem in cattle farming in Malaysia. The high prevalence of liver flukes in the present study may suggest that liver fluke infection in cattle farm may be a problem in Kuala Terengganu, Peninsular Malaysia. While further research needs to validate this suggestion, results from these two farms clearly showed that almost all cattle examined were infected with liver flukes. It was informed by the farmers that during raining seasons the number of freshwater snail suspected to be *Radix (Lymnea) rubiginosa* which is the intermediate host for liver fluke, are high. While this information may be the factors influencing the occurrence of liver fluke infection in both farms, future research should include observation of the intermediate host in order to justify the prevalence of liver infection in cattle farms. Based on personal communication with the staff from Department of Veterinary Services Terengganu, it was found that in farm A, many cattle livers were

condemned after slaughter and this is likely to be related to liver fluke infection. Study on liver fluke infection in abattoir is needed in order to know the severity of liver fluke infection in Kuala Terengganu.

Low prevalence of strongyle eggs in the faeces of cattle in both farms may be due to the routine monitoring by the Department of Veterinary Services, where the animals were treated with albendazole from the Benzimidazole group (DVS, personal communication). This was supported by [17] who reported that Benzimidazole resulted in 100% efficacy against nematodes in cattle of selected farms in Germany and Sweden.

Haemonchus sp. was found to be the most predominant nematode, followed by other nematode such as *Oesophagostomum* spp. and *Trichostrongylus* spp., which is supported by other literatures [18, 19].

This present study disclosed that ixodid ticks mainly from the genus *Boophilus* are the main genera of ticks infesting both farms followed by *Haemaphysalis* and *Rhipicephalus*. This finding is similar to the findings of [20] which recorded that the most common tick collected from cattle in Malaysia were from the genus *Boophilus* followed by a small number of *Haemaphysalis*. The dominance of *Boophilus* sp. over other species might be due to the requirement for only one host to complete the life cycle, compared to *Haemaphysalis* and *Rhipicephalus* which require more than one host to complete their life cycles.

In this study, tick infestation in cattle was highest in the groin area and least on the leg and tail regions. This finding is supported by [21] who found that hard tick infestation was most prevalent in the groin area. [22] also supported the findings by reporting hard tick infestation on groin and mammary glands was most prevalent in cattle. This is due to the fact that ticks prefer moist and protected areas with thin skin and good blood circulations [23].

Only *Theileria* sp. was confirmed as the parasite infecting the red blood cells of the cattle in both farms while neither *Babesia* nor *Anaplasma* was detected from thin blood smears. The presence of *Theileria* in cattle was reported previously by [20]. Giemsa-stained blood smear detection was noted to have few limitations in identifying blood parasites, such as the impossibilities in *Babesia* detection after acute febrile phase [14], difficulties in *Anaplasma* detection in some acute infection or young red blood cells [24] and the difficulties for morphological identification of *Theileria orientalis* variants [25]. Suggested methods for *Babesia* detection are Immunofluorescent Antibody Test (IFAT) [26] and Enzyme-linked Immunosorbent Assay (ELISA) [26, 27]. For *Anaplasma* detection, the suitable method is ELISA [28].

Although *Theileria* was found in nearly all cattle sample, two were proven anaemic by low PCV values whereas the other showed normal PCV values. This would indicate a possibility that the infecting *Theileria* sp. might be benign. However, subclinical infection by pathogenic strains is possible and can turn into clinical infection with prominent symptoms depending on stress level and immunocompetency of cattle [29]. Therefore, good management of cattle and appropriate treatment for *Theileria* infection in cattle in both farms are encouraged.

5. CONCLUSIONS

Based on the study conducted on two cattle farms located in Kuala Terengganu, liver fluke infection and tick infection were identified as the major parasite problem in cattle in Terengganu. However, the results obtained from this study are still inconclusive. Therefore, further studies on the prevalence of endo- and ectoparasites of cattle may shed an additional light on the epidemiology of parasitic infestation in Terengganu. Therefore, appropriate disease control and management programs could be organized and applied in cattle farms of Terengganu.

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