UNIVERSITI TEKNOLOGI MARA

IDENTIFICATION OF TICKS, LICE AND TICK-BORNE BACTERIA FROM SELECTED RUMINANT FARMS IN PENINSULAR MALAYSIA

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ABSTRACT

Ticks are obligate haematophagous arachnids that feed on a wide range of hosts, while lice are permanent parasitic insects that infest on a specific host species. In Malaysia, previous studies on ticks and lice were conducted. However, not much was known on these parasites in farm ruminants, particularly their prevalence, distribution, diversity and tick-borne pathogens that may affect both humans and animals. The tick and louse collection were carried out on 28 farms situated in four regions of the Peninsular Malaysian, namely the central, northern, southern, and eastern regions. Our findings revealed that among the farm ruminants, ticks were exclusively infesting cattle whereas lice feed on goats and sheep. The Southern cattle tick, *Rhipicephalus microplus*, emerged as the most prevalent species, accounting for 99.06% of all tick specimens collected. Other identified species included the red tick, *Rhipicephalus haemaphysaloides* (0.47%), the bispined cattle tick, *Haemaphysalis bispinosa* (0.39%), and Wellington's poultry tick, *Haemaphysalis wellingtoni* (0.08%). For lice, *Bovicola caprae* was the most prevalent species (90.05%), followed by *Linognathus africanus* (7.28%), *Bovicola ovis* (2.49%) and *Haematopinus quadripertusus* (0.18%). Both *Rhipicephalus microplus* and *Bovicola caprae* exhibit extensive geographical distributions across the country, being detected in all four regions and in substantial numbers. Three pools of *R. microplus* were found to be positive for *Borrelia* species via PCR, specifically identical to *Borrelia theileri*, marking the first report of this occurrence in Malaysia. No *Rickettsia* and *Bartonella* pathogens were detected in the collected ticks. This study serves as a foundational step toward mitigating the potential impact of ectoparasites on farm animal health and human welfare in Malaysia.

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CHAPTER ONE
INTRODUCTION

1.1. Background of project

Diseases caused by tick-borne pathogens are a growing concern around the globe (Parola *et al*., 2008). Malaysia, as a tropical country, is not excluded from the threat of tick-borne pathogens but serves as an ideal habitat for a wide variety of ticks. Ticks are small arachnids that are capable of transmitting pathogens of many infectious diseases such as anaplasmosis, rickettsiosis, babesiosis and many arboviruses (e.g., tick-borne encephalitis viruses) (Service, 2012). Despite its their prevalence and pathogenicity around the globe, there is little regional information on tick diversity and distribution in Malaysia, particularly in areas where high risk groups live (e.g., the farm population).

A considerable amount of literature has been published on human and animal cases of tick infestations (Indudharan *et* al., 1995; Indudharan *et* al., 1996; Indudharan *et al*., 1999; Srinovianti and Raja Ahmad, 2004; Amin *et al*., 2007; Mariana *et al*., 2008; Lazim *et al*., 2012; Shibghatullah *et al*., 2012; Abdul Rahim *et* al., 2013; Hamat *et al*., 2017; Rajinder and Nik Adilah, 2017). Furthermore, there are several seroprevalence and molecular studies for tick-borne pathogens on both humans and animals (Rahman *et al*., 2010; Koh *et al*., 2015; Khoo *et al*., 2017; Khoo *et al*., 2018; Prakash *et al*., 2018). Even so, these studies are limited in their exclusivity, in which they provide inadequate insights to the overall distribution of ticks and their pathogens in Peninsular Malaysia. For instance, most of these studies focus on domestic and wild animals, as opposed to farm animals where their interaction with humans is common. Secondly, these tick surveillances prioritise more on the indigenous community, and few were done on farm workers, who are also one of the high-risk groups for tick-borne disease transmission.

With such few fundamental data, it is difficult to conduct a risk assessment of tick-borne diseases among Malaysians. Therefore, this study provides an essential insight on the tick and tick-borne bacteria prevalence and distribution in the Peninsular Malaysia.