

IXODID TICKS ON DOMESTIC ANIMALS IN SAMUT PRAKAN PROVINCE, THAILAND

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Abstract. The prevalence of tick-harboring domestic animals, tick density, and the species of ticks were studied throughout the year 2000, in Muang Samut Prakan, Bang Phli and Phra Pradaeng districts of Samut Prakan Province. The animals examined were *Canis lupus familiaris* (450), *Bos indicus* (cross-bred) (189), *Bos taurus* (30), *Bubalus bubalis* (171) and *Sus scrofa domestica* (450). The total number of collected ticks was 1,491. The pigs did not harbor ticks. The stages of ticks collected were larvae, nymphs and adults. The prevalence rates of tick-harboring were 46% (*Canis lupus familiaris*), 42.86 % (*Bos indicus*, cross-bred), 33.33% (*Bos taurus*) and 9.35% (*Bubalus bubalis*). The tick densities were 2.22 (*Bos indicus*, cross-bred), 2.16 (*Canis lupus familiaris*), 1.16 (*Bos taurus*) and 0.36 (*Bubalus bubalis*). Only 2 species of ixodid ticks, *Boophilus microplus* and *Rhipicephalus sanguineus*, were found. *R. sanguineus* was the dominant species of tick. The percentage of *R. sanguineus* was 65.2 % and *B. microplus* was 34.8 %. In Muang district, *R. sanguineus* was the dominant species in *C. lupus familiaris*; in Bang Phli district, *B. microplus* was the dominant species in *Bos indicus* (cross-bred). The density of *B. microplus* was high in the summer season; the density of *R. sanguineus* was high in the winter season. The number of ticks depended on the geographic location, animal host and season.

INTRODUCTION

Ixodid ticks (hard ticks) are ectoparasites. They are the vectors of many important diseases, such as the viral infections Russian spring summer encephalitis (RSSE), Kyasanur forest disease (KFD), Colorado tick fever and Langat virus encephalitis (LANE); protozoan infections such as babesiosis (piroplasmosis); bacterial infections; rickettsial diseases such as the spotted fever group (SFG), American spotted fever (AMS), Boutonneus fever, African tick fever, Russian tick typhus and Q fever; and spirochetal infections such as relapsing fever (Service, 1996). Ticks are arthropods in the Acari group which comprises 3 Families; Ixodidae (13 genera, 650 species), Argassidae (5 genera, 150 species) and Nuttallielidae (1 genera, 1 species). In 1961–1980, Tunskul *et al* (1983) studied ticks in 47 provinces of Thailand: a total of 10 genera and 53 species were found (8 genera/49 species of hard ticks and 2 genera/4 species of soft ticks). The 8 genera of hard ticks were *Amblyomma*, *Aponomma*, *Boophilus*, *Dermacentor*, *Haemaphysalis*, *Ixodes*, *Rhipicephalus* and *Nosomma*; the 2 genera of soft ticks

were *Argas* and *Ornithodoros*. The ectoparasites of cows and buffalos in Chiang Mai Province have been identified as 31 species of arthropods such as insecta; Anoplura, Diptera and Lepidoptera; mites; Acariforms: ticks (parasitiform; *B. microplus* and *R. sanguineus*) (Arithchart, 1983). A strain of Langat virus (LGT), T-1674, was isolated from a pool of *Hemaphysalis papuna* Thorell collected in the forest of the Khao Yai National Park in Thailand: this was the first report of a natural infection of *Hemaphysalis* ticks with LGT and of the isolation of this arbovirus in Thailand (Bancroft *et al*, 1976).

The prevalence, density and species of the ticks that had parasitized domestic animals in 3 districts of Samut Prakan Province were studied; tick variation with season was also investigated.

MATERIALS AND METHODS

This study investigated 3 areas of Samut Prakan Province, Muang, Phra Pradaeng and Bang Phli districts, in 3 seasons from March 2000 to February 2001. The domestic animals, *Canis lupus familiaris*, *Bos indicus*, *Bos taurus*, *Bubalus bubalis* and *Sus scrofa domestica*, were examined for ticks. Fifty animals were chosen for tick accumulation in each season, summer, rainy season and winter. Ticks were collected once per season by hand-removal from the ear, tail, neck and leg of the animals in a 15 minute period. The ticks were fixed in 70% alcohol in a sample

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tube. The stage *eg* larva, nymph and adult, was identified according to the method of Kratz (1978). The prevalence of ticks was calculated using the following formula:

$$\text{Prevalence rate in each animal} = \frac{\text{Infected animals harboring tick} \times 100}{\text{Total number of animals surveyed}}$$

The numbers of animals studied were 450, 189, 30, 171 and 450 for *C. lupus familiaris*, *B. indicus*, *B. taurus*, *B. bubalis* and *S. scrofa domestica* respectively.

RESULTS

The percentage of ticks harbored by domestic animals: *C. lupus familiaris*, *B. indicus*, *B. taurus*, *B. bubalis* and *S. scrofa domestica* was shown in Table 1. The highest prevalence rate was found in *C. lupus familiaris* (46%). The tick prevalence rates in *Bos indicus*, *Bos taurus*, and *Bubalus bubalis* were 43.92%, 33.33%, 9.36% and respectively. No docking ticks were found in *S. scrofa domestica*.

The domestic *C. lupus familiaris* and *B. indicus* were tick harboring animals in Muang, Bang Phli and Pra Padaeng districts with percentages of tickes ranged from 26.67% to 50.67%. *Sus scrofa domestica* did not harbor ticks; the ticks were found to affect *Bos taurus* only in Phra Pradaeng area (33.33%).

The number of tick-harboring animals per season is presented in Table 2. The prevalence rate in *Canis lupus familiaris* was at its highest in the rainy season (52.67%) and at its lowest in the summer (41.33%). In *Bos indicus*, tick-harboring was highest (61.9%) in the summer and lowest (31.75%) in the rainy season. In *Bos taurus*, tick-harboring was high (40%) in the rainy

season and winter and at its lowest (20%) in the summer. *Bubalus bubalis* was most affected (12.28%) in the winter and least affected (7.02%) in the rainy season.

The total number of ticks collected from the domestic animals in the three areas throughout the whole year was 1,491. We found 2 types of hard ticks: *Boophilus microplus* (34.8%) and *Rhipicephalus sanguineus* (65.2%). Both species were commonly presented in all areas of the study. Only nymph and adult stages of *B. microplus* were found, not the larva. However, all stages of tick were found for *R. sanguineus* which parasitized only *Canis lupus familiaris*. *B. microplus* was found to prefer *Bos indicus* (Table 3).

Of the total 1,491 collected ticks, 671, 501 and 319 ticks were from in Bang Phli, Muang and Phra Pradaeng districts, respectively. Tick density per host animal in *Bos indicus*, *Canis lupus familiaris*, *Bos taurus* and *Bubalus bubalis* was 2.22, 2.16, 1.16 and 0.37 ticks, respectively.

DISCUSSION

Environmental conditions are likely to change ticks' behavior, growth, development, survival rate and reproduction. The differences in tick prevalence in each animal species might be due to differences in animal immunity.

Season and the geographic areas appeared to affect the tick prevalence and density in domestic animals. These differences might be due to temperature and/or moisture variations in each season which affect the growth and reproduction of ticks. The *Canis lupus familiaris* in Muang district had the highest tick prevalence.

Table 1
Percentage of ticks harbored by animals in each district.

Animal	No. studied	Percentage of tick(s) harbored by domestic animals in 3 districts of Samut Prakan Province			
		Muang	Bang Phli	Phra Padaeng	Total
<i>Canis lupus familiaris</i>	450	50.67	42	45.33	46
<i>Bos indicus</i>	189	45.83	45.33	26.67	43.92
<i>Bos taurus</i>	30	0	0	33.33	33.33
<i>Bubalus bubalis</i>	171	19.04	8	0	9.36
<i>Sus scrofa domestica</i>	450	0	0	0	0
Total	1,560	26.38	23.83	23.77	24.5

Table 2
Number of tick-harboring animals per season.

Animals	Number of ticks harbored by domestic animals during 3 seasons (%)			
	Winter	Rainy season	Summer	Total
<i>Canis lupus familiaris</i>	44	52.67	41.33	46
<i>Bos indicus</i>	38.1	31.75	61.9	43.92
<i>Bos taurus</i>	40	40	20	33.33
<i>Bubalus bubalis</i>	12.28	7.02	8.77	9.36
<i>Sus scrofa domestica</i>	0	0	0	0
Total	23.49	24.88	28.42	24.5

Table 3
Density of *Boophilus microplus* and *Rhipicephalus sanguineus* among domestic animals in 3 districts of Samut Prakan Province.

Animal	Number of <i>B. microplus</i>				Number of <i>R. sanguineus</i>				Total ticks
	Muang	Phra Pradaeng	Bang Phli	Total	Muang	Phra Pradaeng	Bang Phli	Total	
<i>Canis lupus familiaris</i>	1	1	0	2	411	262	297	970	972
<i>Bos indicus</i>	75	21	323	419	0	0	2	2	421
<i>Bos taurus</i>	0	35	0	35	0	0	0	0	35
<i>Bubalus bubalis</i>	14	0	49	63	0	0	0	0	63
<i>Sus scrofa domestica</i>	0	0	0	0	0	0	0	0	0
Total	90	57	372	519	411	262	299	972	1,491

In 1998, Polseela collected 3,742 ticks from 795 animals and a further 1,729 ticks by the grass-dragging method: a total of 5,471 ticks (unpublished data). Four genera and four species of ticks, *Boophilus microplus*, *Rhipicephalus sanguineus*, *Nosomma monstrosus*, and *Haemaphysalis bandicota* were found. Different tick species were found in different kinds of host. Some tick species presented in only one kind of host (specific hosts). Of these four species only *Boophilus microplus*, was found in this study: widely spread out in many areas of the Muang, Bang Phli and Phra Pradaeng districts.

The tick densities in the animal hosts varied during the three seasons. In term of host specificity, the tick *B. microplus* was widely distributed in *B. indicus*, *B. taurus* and *B. bubalis*. However, it was not found in *C. lupus familiaris* except in the summer time. In contrast, the tick *R. sanguineus* were commonly found in *C. lupus familiaris* throughout the year and was also found in *B. indicus* during the winter.

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REFERENCES

- Arithchart U. Ectoparasite of economic animals. Entomology Department, Faculty of Agriculture, Chiang Mai University, 1983:112-9.
- Bancroft WH, Scott RM, Snitbhan R, Weaver RE, Gould DJ. Isolation of langat virus from *Haemaphysalis papuana* Thorell in Thailand. *Am J Trop Med Hyg* 1976;25:500-4.
- Kratz GW. A manual of Acarology. Corvallis, Oregon: Oregon State University Book Stores, 1978.
- Polseela P. Study on species of ticks of scrub forest, wild and domestic animals in Khon Kaen Province. Khon Kaen: Khon Kaen University, 1998. MS Thesis. 146pp.
- Service MW. Medical entomology for students. London: 1996:224-45, 423-46.
- Tunskul P, Stark HE, Inlao I. A checklist of Thailand [Acari (Metastigmata) Ixodoidea]. *J Med Entomol* 1983;20: 330-41.