

Original article

## COMPARATIVE STUDY ON PREVALENCE OF TRYPANOSOMOSIS IN DAIRY CATTLE IN CHIANG MAI AND LAM PHUN PROVINCES DIAGNOSED BY HEMATOCRIT CENTRIFUGATION TECHNIQUE AND CARD AGGLUTINATION TEST

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**Abstract** The forty six zero-grazing dairy farms with 743 dairy cattle in Chiang Mai and Lam Phun provinces were selected in order to determine the prevalence of trypanosomosis during October 2003 to February 2004. Besides, Comparison the prevalence between the disease diagnosed by Hematocrit Centrifugation Technique (HCT) and Card Agglutination test (CATT) was statistically estimated. The results indicated that the parasitological prevalence was 1.21%; on the other hand, the seroprevalence of trypanosomosis was 42.35%. Statistical expected agreement by chance was calculated that there was slight agreement between HCT and CATT ( $\kappa = 0.05$ ). For accurate epidemiological assessment of trypanosomosis, both parasitological and serological diagnostic methods should be concurrent performed.

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**Keywords:** prevalence, trypanosomosis, dairy cattle, hematocrit centrifugation method, card agglutination technique

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*Trypanosoma evansi*, a protozoan blood parasite, is the causative agent of surra or trypanosomosis in Thailand. It infects a wide range of mammalian animals, including rumi-

nants in the subtropical and tropical regions. In the north and north-east of Thailand, where the dairy production industry has been expanding significantly during the last decades, the

incidence as well as the prevalence of *T. evansi* infections in dairy cattle herds increased rapidly causing severe economic losses.<sup>(1)</sup> Clinical signs observed in cattle during the acute stage of infection are characterized by anemia, intermittent pyrexia, progressive loss of condition and weakness.<sup>(1-3)</sup> Chronic infections are characterized by herd sterility and abortion of fetuses particular in the first 4<sup>th</sup> to 5<sup>th</sup> month of gestation,<sup>(4,5)</sup> severe anemia and milk and weight loss.<sup>(2,6,7)</sup>

In most hosts, *T. evansi* can induce mild clinical or subclinical carrier state with low parasitaemia in which it is difficult to demonstrate the parasites. Concentration methods such as Hematocrit Centrifugation technique (HCT), Dark-ground/phase-contrast, Buffy coat technique and Haemolysis techniques become necessary. Animal inoculation is also used to reveal subclinical infections in domestic animals.<sup>(8)</sup>

Though detection of parasite in an animal is the most specific and available diagnostic test, its practical value is limited by lack of diagnostic sensitivity. Therefore, indirect techniques for the detection of trypanosomal antibodies or antigens in the body fluids of the host contribute substantially to the diagnosis of trypanosomosis. Card Agglutination technique (CATT) is the alternative diagnostic technique recommended by OIE that is more likely to classify correctly truly infected animals.

The objective of this study is to compare the prevalence of Trypanosomosis of dairy cattle in the early cold season in Chiang Mai and Lam Phun provinces by different diagnostic methods including parasitological methods and CATT.

## Methodology

### Study area

The study was conducted in Chiang Mai and Lam Phun provinces which belong to the Upper North region of Thailand. These provinces are characterized by a high number of dairy herds mostly managed in zero-grazing unit. Besides, Chiang Mai University has been regularly visiting these areas to measure animal health and productivity data. There were six districts distributing in Chiang Mai and Lam Phun that were selected belonging to the highest ranking of dairy population, including San Kam Phang, Mae On, San Sai, and San Pa Tong districts of Chiang Mai province and Ban Thi and Ban Hong of Lam Phun province.

### Study population

The 46 dairy herds managed in zero-grazing units from which total approximately 280 farms were selected by stratified random sampling. The 743 dairy cattle were selected by stratified random sampling from these 46 farms were collected whole blood and sera for parasitological and serological diagnosis during October 2003 to February 2004. Only 477 sera stratified selected from these 743 samples were tested by serological method.

### Study design

Cross sectional study (CSS) to investigate the prevalence of trypanosomosis was performed. Different diagnostic methods including parasitological methods as HCT and mice inoculation and CATT<sup>(9)</sup> were used. Statistical evaluation the prevalence and agreement between HCT and CATT were calculated.

## Results

Parasitological prevalence was estimated based on HCT result while seroprevalence was estimated based on CATT result. Detection of trypanosomes by parasitological methods indicated overall 1.21 % prevalence as present in table 1. The 1.33% and 1.21% of prevalence by HCT were indicated in Chiang Mai and Lam Phun province, respectively. The overall seroprevalence diagnosed by CATT was 42.35%. Provincial prevalence of Trypanosomosis was 4.28% and 56.67% in Chiang Mai and Lam Phun provinces, respectively.

Kappa (k) value was calculated as 0.05 that indicated slight agreement between HCT and CATT. It means that there was slight relationship between these two tests.

## Discussion

The aim of this study was to estimate the prevalence of trypanosomosis in dairy cattle of Chiang Mai and Lam Phun provinces and to

compare the prevalence of disease diagnosed by HCT and seroprevalence of disease using CATT. The sampling frame consisted of 46 dairy farms from which 280 farms were selected by stratified random sampling. From the selected farms, the 743 dairy cattle were also selected by stratified random sampling from these 46 farms were collected whole blood and sera for parasitological and serological diagnostic methods during October 2003 to February 2004. Only 477 sera stratified selected from total 743 samples were tested by serological method as CATT.

Obviously, there is a discrepancy between the parasitological prevalence (1.21%) and the seroprevalence (42.35%). The low parasitological prevalence can be attributed to the low analytical sensitivity of HCT;  $6.25 \times 10^3$  trypanosomes per milliliter of blood.<sup>(10)</sup>

The agreement between the parasitological detection as HCT and serological method as CATT was calculated by kappa test. This test

**Table 1.** Estimates of prevalence and seroprevalence of trypanosomosis in the study population distributing in provinces and districts of each province

Province	District	Parasitological method			Serodiagnostic method		
		No.	Positive	%	No.	Positive	%
Chiang Mai	SanKamPhang	139	0	0	94	34	36.17
	MaeOn	167	6	3.59	111	57	51.35
	SanSai	167	0	0	74	18	24.32
	SanPaTong	204	3	1.47	138	59	21.01
	<b>Total</b>	<b>677</b>	<b>9</b>	<b>1.33</b>	<b>417</b>	<b>168</b>	<b>40.28</b>
Lam Phun	BanThi	51	0	0	50	29	58.00
	BanHong	15	0	0	10	5	50.00
	<b>Total</b>	<b>66</b>	<b>0</b>	<b>0</b>	<b>60</b>	<b>34</b>	<b>56.67</b>
<b>Total</b>	<b>743</b>	<b>9</b>	<b>1.21</b>	<b>477</b>	<b>202</b>	<b>42.35</b>	

measures the agreement of test results beyond chance agreement. The overall agreement between HCT and CATT was quite low as indicated by low kappa coefficients ( $k=0.05$ ). So that, there was slight relationship between these two tests.

It is pointed out that diagnosis of the disease is a primary step in the proper control strategies.<sup>(11)</sup> An accurate epidemiological assessment of trypanosomosis is important in all stages of control program in order to describe the local disease impacts and the success of the control measures. In situation where case finding and treatment is part of the control strategies, accurate diagnostic techniques are required to achieve an effective application of chemotherapeutic drugs. The main difficulty of diagnosing trypanosomal infection is the frequent scarcity of parasites in the host and the severity of infection is not necessarily related to parasitaemia. It may be difficult or impossible to find trypanosomes in the blood of a chronically infected animal even when it is about to die.<sup>(12)</sup>

Though detection of parasite is the most specific and available diagnostic test, its practical value is limited by lack of diagnostic sensitivity. Therefore, indirect techniques for the detection of trypanosomal antibodies or antigens in the body fluids of the host contribute substantially to the diagnosis of trypanosomosis. CATT is an alternative diagnostic technique recommended by OIE with the high sensitivity and specificity as 68.8% and 100%,<sup>(13)</sup> respectively. It is more likely to classify correctly truly infected animals. Besides, in the situation where there is overt disease, CATT tests can be used to target individual animals

for treatment with trypanocidal drugs. For declaring disease-free status, serial testing – ELISA followed by re-testing of suspect samples by CATT is recommended.

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