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Prevalence of Gastro-Intestinal Parasites of Dairy Cows in Thailand

Sathaporn Jittapalapong[1]*, Arkom Sangwaranond[1], Burin Nimsuphan[1], Tawin Inpankaew[1], Chamnonjit Phasuk[1], Nongnuch Pinyopanuwat[1], Wissanuwat Chimnoi[1], Chanya Kengradomkij[1], Pipat Arunwipat[2] and Tanit Anakewith[3]

ABSTRACT

Gastro-intestinal (GI) parasitic infections remain one of the major constraints to ruminant production in Thailand. Insidious productivity losses through reduced feed intake and decreased efficiency in feed utilization, associated with subclinical or chronic conditions of parasitic infections are often the cause of large economic losses. The objectives of this study were to: 1) assess the prevalence of GI parasitism in dairy cows in Thailand; 2) determine the species of existing GI parasites; and 3) compare GI parasitic rates of cows from different regions of Thailand. The study was conducted in four parts of Thailand. A total of 1,599 fecal samples were collected and subjected to ethyl-acetate centrifugation to identify the stages of any parasites. The overall prevalence of parasitic infection was 46.6 % (745/1599). Cows aged between 1 to 5 y had the highest infection rate (51.4 %). Cows older than 5 y and younger than 1 y had rates of 41.8 and 33.8 %, respectively. The highest percentage of infected cows by region was in the South (98.4 %). Cows in the North, Central, and Northeast were had infection rates of 66.4, 18.2 and 16.7 %, respectively. The herd infection rate of GI parasites in dairy farms in the South was the highest (14/14, 100 %) compared to the North (37/42, 88.1 %), Northeast (30/46, 65.2 %), and Central (28/60, 46.7 %). GI parasites were identified as *Entamoeba*, rumen fluke, coccidia, Strongyles, *Fasciola, Moniezia*, *Trichuris*, *Strongyloides,* and *Giardia*. The high incidence of parasitism of cows might have been due to the relative low influence of feeding behavior and a deworming program. In circumstances of very high infection, management and treatment is highly recommended.

Keywords: Gastro-intestinal (GI) parasites, ethyl-acetate centrifugation, dairy cows, Thailand

INTRODUCTION

Gastro-intestinal (GI) parasitic infections are characteristic of pastoral grazing systems and many GI parasitic species have developed resistance to anthelmintic drugs (Waller, 1994; Min *et al*., 2005). The productivity of animals is constrained due to GI parasitic infections that can have extensive consequences, ranging from reduced animal performances to mortality (Sykes, 1994; Waller, 1999). Subclinical GI parasitic infections occasionally depress feed intake and animal productivity, impair tissue deposition and lower growth rate (Sykes, 1994). Mortality in

1 Department of Parasitology, Faculty of Veterinary Medicine, Kasetsart University, Bangkok 10900, Thailand.

2 Department of Farm Resources and Production Medicine, Faculty of Veterinary Medicine, Kasetsart University, Bangkok 10900, Thailand.

3 Department of Livestock Development, Ministry of Agriculture and Co-operation, Bangkok 10900, Thailand.

* Corresponding author, e-mail: fvetspj@ku.ac.th

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herds may exceed 40 %, particularly in young animals, while weight losses of 6-12 kilogram per year per animal may occur (Hawkin, 1993; Waller, 1999).

In developing countries, GI parasites are associated strongly with grazing management since pastures are usually not provided. Most pastures for animal rearing are public and are used and shared by animal owners without any regulations or guidelines. The control of cattle parasites has many beneficial effects related to productivity, including increased weight gain, feed conversion, milk production, reproductive performance, carcass quality and immune status, and may reduce morbidity and mortality.

In Thailand, it was found that GI parasitism in ruminants was present throughout the year, with the intensity higher during the rainy season (Jittapalapong *et al*., 1987a, 1987b). Temperature and humidity are the primary factors involved in the development and survival of the eggs, larvae, cysts and oocysts in pasture (Agneessens *et al*., 1997). Currently, the infection rate of GI parasites of cows in Thailand has not been updated for more than a decade. Comprehensive knowledge of the epizootiology of parasitism is a crucial requirement for the sustainable control of helminthes, as it interacts with the host under specific climatic, management and production conditions. The objectives of the present study were to determine the infection rate of GI parasites in dairy cows, to identify the species of the parasites and their geographical distribution and to compare the GI parasitic rates of cows from different regions in Thailand. Knowledge of the prevalence of GI parasitic infections in cows would help in the development of potential control strategies.

MATERIALS AND METHODS

Study area

Samples were collected from March to September in 2007 in 12 provinces representing all parts of Thailand (North, Northeast, Central, and South) based on the dairy population of the top three provinces in each of the four regions of Thailand with population data on dairy cows sourced from the Department of Livestock Development (DLD) (2006). In total, 1,599 random samples from 162 farms were collected. All dairy cows belonged to small farm holders rearing 5-20 milking cows, with the majority from tied stall barns with component feeding.

Selection of Farms

A sample of at least 35 cows was chosen per province based on an estimated prevalence of 50 % and a 95 % confidence interval (CI) at a desired precision level of 5 %, since the prevalence of GI parasites was unknown in some areas. While most dairy cattle are raised on small farms each with 5-10 animals, the cows sampled for the present study were from herds with 5-20 milking cows.

Breed type

Cows were from the Holstein-Friesian breed and generally, had been in low-input systems for milk production with little supplementary feeding. Most dairy cows are kept indoors due to their market value and to facilitate milking.

Grazing system

The cows were reared under two management systems: an intensive system (no grazing) with good quality dairy cows and an extensive system (grazing) under fair management. Under the intensive system, the cows were mainly stall-fed with feed placed on the floor, but sometimes they were tethered on nearby pasture when they were in their dry period. Under the extensive system, most cows were tethered exclusively on communal grazing land, shared by many herds.

Fecal sample collection

Fecal samples were obtained directly from the rectum, placed in a plastic bag, labeled, packed and dispatched in a cool box to the Department of Parasitology, Faculty of Veterinary Medicine, Kasetsart University where samples were stored at 4 °C until examined.

Fecal examination technique

Fecal samples were examined individually for GI nematodes and trematodes' eggs, as well as for protozoan cysts, trophozoites and oocysts. Sampling used the method of formalin-ethyl acetate centrifugal sedimentation. Briefly, fecal samples were mixed with normal saline and centrifuged at 500 G for 3-5 min. The sediment was separated, added with 10 % formalin and ethyl acetate, and centrifuged for 5 min at 500 G. Subsequently, the recovered sediment was examined under a light microscope.

Statistical analysis

Chi-square and the Number Cruncher Statistical System (NCSS) ver. 2000 (Kaysville, UT) computer programs were used to assess differences in the prevalence and intensity of infection. In addition, correlations were investigated between environmental variables and the infection patterns, as determined by the probability that individual daily cows were infected. Differences were considered significant at the level $P < 0.05$.

RESULTS

Out of 1,599 cow fecal samples, 745 (46.59 %) were found to be positive for either helminth or protozoan parasites (Table 1). The results of GI-parasitic populations in cows from different age groups demonstrated that cows aged between 1 and 5 y had the highest infection rate (465/904, 51.38 %) compared to cows older than 5 y (237/567, 41.8 %) and younger than 1 y (43/127, 33.8 %).

Regional analysis indicated that most cows in the South were infected (98.4 %), while cows in the North, Central, and Northeast were infected at rates of 66.4, 18.2 and 16.7 %, respectively. The herd infection rate of GI parasites in dairy farms in the South was the highest (14/

Table 1 Factors associated with GI-parasitic infections of cows in Thailand.

Parameter		Number of positive cows/farm examined (%)		Odds ratio (95 % confidence interval)	P value
Farm location	Central	28/60	(46.67)	1	0.05
	Northeast	30/46	(65.22)	0.91 (0.02 – 3.47)	
	North	37/42	(88.09)	0.59 (0.13 – 2.66)	
	South	14/14	(100)	0.56 (0.13 – 2.37)	
	Total	**109 /162**	**(67.28)**		
Cow age	<1 y	50/127	(39.37)	1	0.04
	> 5 y	277/ 567	(48.85)	1.29 (0.17 –9.80)	
	1-5 y	535 /905	(59.18)	1.97 (0.26–15.23)	
	Total	**862/1,599**	**(53.94)**		
Region	Northeast	72/ 384	(18.75)	1	0.01
	Central	142/ 385	(36.88)	0.31 (0.03 – 3.00)	
	North	462/642	(71.96)	0.56 (0.13 – 2.37)	
	South	186/188	(99.46)	0.59 (0.13 – 2.66)	

14, 100 %) compared to the North (37/42, 88.1 %), Northeast (30/46, 65.2 %), and Central (28/60, 46.7 %).

GI parasites were identified as *Entamoeba*, rumen fluke, coccidia, Strongyles, *Fasciola, Moniezia*, *Trichuris*, *Strongyloides,* and *Giardia* (Table 2). The three most frequently found parasites in dairy cows were *Entamoeba*, rumen fluke and coccidia (Table 3).

DISCUSSION

Knowledge of the epizootiology of parasitism is a crucial requirement for the sustainable control of GI parasites, as they interact with their hosts under specific climatic, management and production conditions (Almeria and Uriarte, 1999; Waller, 1999). Data from the present study indicated that GI-parasitic infection of dairy cows in Thailand was very common, with an overall prevalence of 46.59 % (Table 1). Compared to previous reports, the infection rate in the present study was lower, since Jittapalapong *et al*. (1987a) and Pinyopanuwat *et al*. (2001) had reported the infection rate of GI parasites in the Nongpho area was 61.4 and 67 %, respectively. Furthermore, for more than a decade, these infection rate levels have reflected the lack of success from the deworming program and highlighted ineffective management, since the GI parasite is a fundamental cause of depressed production and growth rates in dairy cows.

Table 2 GI-parasites and their stages identified in dairy cows in Thailand.

Parasite	Stage of identification	% positive
Nematodes		
Strongyles	Egg	6.07 (97/1,599)
Trichuris spp.	Egg	0.63 (10/1,599)
Strongyloides spp.	Egg	0.19 (3/1,599)
Trematodes		
Fasciola spp.	Egg	3.69 (59/1,599)
Rumen flukes	Egg	28.41 (454/1,599)
Cestodes		
Moniezia benedeni	Egg	2.32 (37/1599)
Protozoa		
Coccidia	Oocyst	7.32 (117/1,599)
Giardia spp.	Cyst	0.06 (1/1,599)
Entamoeba spp.	Cyst and Trophozoite	33.04 (528/1,599)

Table 3 Top three GI parasites most frequently found in each region.

Region	GI Parasites		
Central	Coccidia	Rumen flukes	Strongyles
	(5.71 %, 22/385)	(5.45 %, 21/385)	(5.19 %, 20/385)
North	*Entamoeba*	Rumen flukes	Coccidia
	(53.42 %, 343/642)	(39.25 %, 252/642)	(11.37 %, 73/642)
Northeast	Rumen flukes	*Entamoeba*	*Moniezia*
	(13.8 %, 53/384)	(1.82 %, 7/384)	(0.78 %, 3/384)
South	*Entamoeba*	Rumen fluyes	Strongyles
	(93.04 %, 174/187)	(68.45 %, 128/187)	(19.25 %, 36/187)

The age group analysis showed that cows younger than 1 y had an infection rate of 33.8 % compared with 64.4 % in 1987 (Jittapalapong *et al.,* 1987a), while cows aged 1 to 5 y had the highest infection rate (51.4 %) in the present study compared with 61.4 % in 1987 (Jittapalapong *et al*., 1987b). The substantial reduction since 1987 indicates that Thai farmers have paid more attention to the health of dairy calves. However, the fact that the rates are still high seems to suggest that farmers do not realize the impact of GI parasitic infections on their animals. The intensity of the helminth infections was lower in young animals (aged less than 1 y). However, the prevalence of helminth was higher in older animals, suggesting that cows are distributors of helminth infection in herds. According to the results of the present study, most cows had a high infection rate; therefore, anthelminthic treatment is needed urgently. It is suggested that the observed differences in the infection prevalence between dairy cows in each region might be due to the grazing behavior of the animals.

Climatic conditions, particularly rainfall, frequently are considered to account for differences in the prevalence of GI-parasitic infection, since infective stages such as eggs, cysts and oocysts are known to survive longer in cool, moist conditions (Waruiru *et al*., 1993; Waruiru *et al*., 2000). In Thailand, high humidity and temperature were found to have a significant influence on the infection rate of GI-parasitic infection of cows (Jittapalapong *et al*., 1987a and 1987b). In the present study, the prevalence of GI-parasitic infections in dairy cows in the South was the highest (100 %, Table 1). The longer rainy season in the South might be the reason and the South might be an endemic area for many parasites. Conversely, in the Northeast region, there are fewer GI-parasitic infections due to the longer drought period.

In Thailand, dairy cows are usually reared under semi-intensive conditions, whereby animals and their young are brought out to graze in the morning near the homesteads, particularly during the cropping season. No grazing activities were observed in the dairy cows during milking. As a consequence, the time spent indoors, in an environment which may already have been contaminated by a variety of parasites, may have subjected the cows to greater exposure to infection.

Although there are many different species of GI- parasites that infect ruminant livestock, there are only relatively few parasites that cause major problems, notably strongyles, rumen fluke, *Moniezia spp*. and coccidia (Table 3). Jittapalapong *et al.* (1987b) reported strongyles, rumen fluke, and *Moniezia* were the top three parasites frequently found in dairy cows at Nongpho in large dairy cow areas. The results for the present study indicated that the types of parasites in dairy cows are still the same and seem to be indigenous parasites in Thailand. GI-parasitic infections in grazing livestock are made up of a mixture of species that all have deleterious effects and collectively lead to chronic economic impacts. Economic evaluations consistently show that the major losses due to parasites are on animal production, rather than on mortality (Hawkin, 1993). The parasitism might influence the productivity, morbidity and mortality of these animals. The parasite-nutrition interactions are exacerbated by the effects of poor nutrition and management leading to decreased efficiency in feed utilization associated with subclinical or chronic conditions of these parasitic diseases.

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