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The Prevalence of Parasitic Infestation of Small Ruminant Farms in Perak, Malaysia

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Abstrak: Penyakit helmintiasis yang disebabkan oleh cacing seperti *Haemonchus contortus,* koksidiosis yang disebabkan oleh *Eimeria sp.* dan infeksi parasit darah seperti penyakit teleriosis yang disebabkan oleh *Theileria sp*. telah dilaporkan merupakan penyebab kepada kemorbidan dan kematian ternakan ruminan kecil setiap tahun di Malaysia. Tujuan kajian ini dijalankan adalah untuk menentukan penyebaran penyakit helmintiasis, koksidiosis dan teleriosis serta nilai *packed cell volume* (PCV) ke atas ternakan ruminan kecil di negeri Perak, Malaysia. Sebanyak 175 ekor ternakan ruminan kecil telah digunakan untuk mengambil sampel darah dan tinja daripada 7 buah ladang ternakan ruminan kecil di daerah Kampar, Larut Matang dan Selama, Kuala Kangsar dan Manjung di negeri Perak untuk pemeriksaan infestasi parasit dari bulan April hingga Julai 2011. Hasil kajian menunjukkan *H. contortus* telah ditemui pada 152 ekor (86.86%) ternakan, *Eimeria sp.* pada 162 ekor (92.57%) ternakan dan *Theileria sp*. pada 25 ekor (14.30%) ternakan. PCV pada kesemua ternakan menunjukkan nilai di antara 7% hingga 44%. Secara keseluruhannya 42 ekor (24%) ternakan menunjukkan tanda-tanda mengalami anemia dengan nilai PCV kurang daripada 21%. Pemantauan berterusan ke ladang-ladang ternakan ruminan kecil akan memberikan maklumat yang berguna kepada penternak bagi membantu menguruskan penyebaran infeksi parasit dan mengekalkan produktiviti ternakan.

Kata kunci: Helminthiasis, Coccidiosis, Theleriosis, Kambing, Kambing Biri-biri

Abstract: Helminthiasis due to strongyles such as *Haemonchus contortus*, coccidiosis caused by *Eimeria* sp. and blood parasite diseases such as theileriosis by *Theileria* sp. have been reported to cause severe morbidity and mortality annually in small ruminants in Malaysia. The aims of this study were to investigate the prevalence of helminthiasis, coccidiosis and theileriosis and to determine the packed cell volume (PCV) value of small ruminants in Perak, Malaysia. Blood and faecal samples were obtained from a total of 175 animals from 7 small ruminant farms in Kampar, Larut Matang and Selama, Kuala Kangsar and Manjung districts in Perak; the samples were examined for parasitic infestations from April to July 2011. The results of this study show that *H. contortus* was found in 152 (86.86%) animals, *Eimeria* sp. was found in 162 (92.57%) animals and the blood protozoa *Theileria* sp. was found in 25 (14.30%) animals. The PCV values of all of these animals were recorded between 7% and 44%. A total of 42 (24%) animals were anaemic, with a PCV of less than 21%. Continuous monitoring of small ruminant farms will provide important information for assisting farmers with managing the spread of parasitic infections and maintaining the productivity of animals.

Keywords: Helminthiasis, Coccidiosis, Theileriosis, Goat, Sheep

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INTRODUCTION

In 2010, the Federation of Livestock Farmer's Association of Malaysia (FLFAM) reported that the population of small ruminants (goat and sheep) were estimated at between 545,000 and 134,000, respectively (FLFAM 2010). Close to 2015, the levels of mutton production were estimated to increase from 8.99% to 35.00% by increasing the goat population to 1.5 million heads (Department of Veterinary Services 2008). To achieve this target, a disease control and eradication program was listed as one of the strategies for boosting the population of small ruminants. The aim of controlling parasitic infestation with helminthiasis, coccidiosis and blood protozoa in small ruminants was to reduce their morbidity and mortality rate.

Recently, helminthiasis, referring mainly to haemonchosis, was shown to be the second most important cause of mortalities in small ruminants in Malaysia (Nor-Azlina *et al*. 2011). Furthermore, Waller (2006) reported that the helminths in goats and sheep, which included *Haemonchus contortus*, *Oesophagostomum* spp., *Cooperia* spp. and *Trichostrongylus* spp., cause severe economic losses in the livestock industry. Further investigation found that the helminth infections were rampant due to the grazing activities of the livestock on pastures contaminated with third stage infective larvae of parasitic nematodes (Chandrawathani *et al.* 2008). Therefore, a diagnosis of helminthiasis and the monitoring of worm burdens in herds and flocks are two tasks that are commonly requested of veterinary laboratories.

Foreyt (1990) reported that coccidiosis is one of the most ubiquitous and economically important diseases of goats. In small ruminants, coccidiosis is mainly caused by *Eimeria sp*. (Soulsby 1982). Goats and sheep harbour their own species of *Eimeria sp*., and there is no cross-infection (McDougald 1979). These unicellular protozoa usually cause acute invasion and destruction of intestinal mucosa; they invade and destroy intestinal cells, resulting in loss of blood and electrolytes and poor absorption of nutrients. The most common sign of infection is diarrhoea, which may be severe and the faeces may contain blood. The pathogenic effect of coccidia can be aggravated by poly-parasitism, affecting the different portions of the digestive tract and the timing of the reproductive patterns (Craig 1986), gastro-intestinal nematodes (Taylor 2009), or even other pathogenic agents such as viruses or bacteria (Wright & Coop 2007). Coccidiosis develops and is exacerbated in association with overstocking or intensive indoor housing and poor sanitation. A diagnosis of coccidiosis can be based on faecal examination or oocyst identification (Urquhart *et al.* 1996).

Another parasitic infestation that affects small ruminant animals is theileriosis, which is a tick-borne haemoprotozoan disease that is caused by *Theileria lestoquardi* (formerly *T. hirci*), *Theileria ovis* or *Theileria separata* (Altay *et al*. 2008). *Theileria* spp. infect healthy animals and cause body weight loss and pale mucous membranes. The presence of *Theileria* spp. can be diagnosed with a blood smear examination.

One of the indicators of parasitic infestation is the packed cell volume (PCV), which is a measure of the anaemic status of animals. Previously, the reported anaemic status was easily obtained through PCV values (Bull *et al.*

2000). Typically, PCV values in goats were reported between 22% and 38% (Schalm *et al.* 1975). The animals were considered anaemic when the PCV value was below than 22% and dehydrated when the values exceeded 38% (Chandrawathani *et al*. 2008).

Thus objective of this study was to investigate the prevalence of helminthiasis, coccidiosis and theileriosis and to determine the PCV value of randomly selected farms in Perak, Malaysia.

MATERIALS AND METHODS

Study Design and Sampling Site

A total of 350 faecal and blood samples were randomly collected from 175 goats and sheep of 7 small ruminant farms in Kampar, Larut Matang and Selama, Kuala Kangsar and Manjung districts in Perak, as shown in Table 1. The samples were examined for their parasitic infestation status using faecal and blood examinations. Rectal faecal collections and jugular venous blood samples were taken between April until July 2011 from approximately 10% of the population in each farm. All samples were processed and diagnosed at the Parasitology Unit, Veterinary Research Institute (VRI), Ipoh, Perak.

Table 1: The type, number and breed of goats and sheep according to their sampling location.

Farm	Location/district	Type of animals	No. of animals (n)	Breed of animals
1	Larut Matang and Selama	Goat	25	Boer
2	Kuala Kangsar	Goat	25	Boer, Katjang
3	Kampar	Goat	30	Boer, Katjang
4	Kampar	Goat	15	Katjang
5	Larut Matang and Selama	Goat	30	Boer
6	Kampar	Goat	20	Boer, Katjang
		Sheep	5	Siamese long tail cross
7	Manjung	Goat	5	Jamnapari
		Sheep	20	Siamese long tail cross
Total			175	

Blood Examination

The blood samples collected were subjected to blood smear examination and microhaematocrit techniques for the examination of blood protozoa and the measurement of the PCV values (Christopher *et al*. 1992). Briefly, blood smears were created and then fixed with methanol and stained with freshly prepared Giemsa stain at pH 7.2. All of the stained smears were then examined under a microscope for the presence of blood protozoa. PCV was determined using a microhaematocrit technique. The collected blood was mixed thoroughly and drawn into a microhaematocrit capillary tube to approximately ¾ of the length.

The free end was sealed (Critoseal®, Illinois, USA) and the tube was centrifuged at 10,000 rpm for 5 minutes. The percentage of PCV was read directly from a microhaematocrit reader (Hawksley Microhaematocrit Reader, Sussex, UK).

Faecal Examination

Faecal samples collected were subjected to the McMaster's and floatation methods as described by Christopher *et al*. (1992). All results were recorded as the number of eggs per gram (epg) for McMaster, and the presence of coccidia oocysts was considered to be a positive examination.

Data Analysis

All data were statistically analysed using Statistical Package for Social Science (SPSS version 13.0, SPSS Inc., Illinois, USA) software for the analysis of variance. All data are expressed as the mean±SEM. Differences between means were considered significant at $p<0.05$.

RESULTS

A total of 150 goats and 25 sheep of various breeds were successfully examined; 175 faecal samples and 175 blood samples were obtained for faecal and blood examinations.

The results are shown in detail in Table 2 and Figure 1. The analysis of the faecal samples showed that 86.86% (n=152) of the samples were positive for helminthiasis. The worm egg counts ranged from 100 to 14,600 epg (1634.44±195.54). Approximately 37.14% (n=65) of the animals showed a lower egg count, with a range between 100 and 500 epg, and 34.29% (n=60) were intermediate (500 to 1000 epg). However, only 15.43% (n=27) showed a high egg count (>1000 epg).

Table 2: Faecal and blood sample examination for helminthiasis coccidiosis, blood parasite cases and PCV values (n=175).

Positive cases	Faecal samples				Blood samples			
	Helminth faecal egg count (epg)			Coccidia oocyst	PCV value (%)			Blood parasite (*Theileria* sp.)
	100–500	600–1000	>1000		0–22	22–38	>38	
Number (n)	65	60	27	162	42	129	4	25
%	37.14	15.43	34.29	92.57	24.00	73.71	2.30	14.30

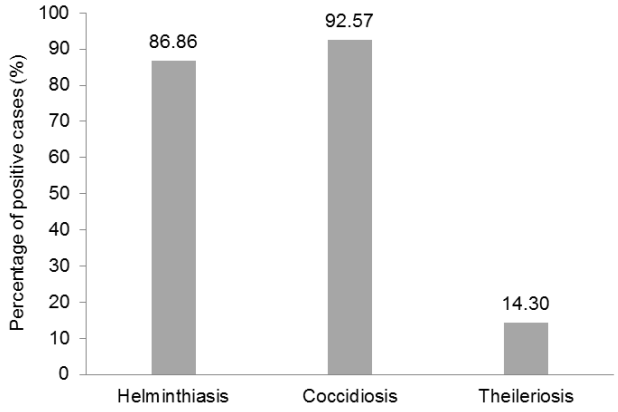

Figure 1: The percentage of parasitic infestation in small ruminant farms in Perak, Malaysia in 2011.

Analysis of the faecal samples also showed that 92.57% (n=162) of the animals were positive for coccidiosis. In this study, the increased numbers of positive coccidiosis cases were shown to be increased along with the number of positive helminthiasis cases.

The examination of the blood samples showed that 14.30% (n=25) of the animals were positive for *Theileria* spp. In addition, the PCV values ranged between 7% and 44%. Of the 175 animals that were examined, 73.71% (n=129) of the PCV values were in the normal range, 24.00% (n=42) were anaemic, and 2.03% (n=4) exhibited high PCV values due to dehydration.

DISCUSSION

Based on the results, there was a high correlation between helminthiasis and coccidiosis. The findings support the previous studies that showed that both diseases have a similar faecal-oral route of transmission (Anderson 1992; Smith & Sherman 1994; Clark & Blake 2012). Through the ingestion of contaminated feed or water, animals become infected with strongyle eggs or coccidia oocysts and develop almost similar gastrointestinal-related clinical signs such as diarrhoea, inappetence, weight loss, poor growth and emaciation.

The epg results were separated into three groups according to their degree of infections (epg of faeces) as mentioned by Hansen and Perry (1994). Low epg (100 to 500 epg) indicates light infection, whereas high epg (>1000 epg) shows the heavy burden of helminth infection. Furthermore, mean epg is commonly used as an indicator for the severity of the infection in a population.

In the field, the PCV value is important for determining the unhealthy animals due to parasite infestation. As previously reported, helminthiasis was known to occur due to blood sucking parasites such as *H. contortus* in the abomasum, which may lead to blood loss, dehydration and anaemia in animals (Rowe *et al.* 1988; Wahab *et al.* 2007). However, anaemia also may be observed

in some cases of severe infestation of coccidia due to intestinal mucosa invasion and destruction by unicellular protozoa (Aumont *et al.* 1984). In theileriosis, in addition to blood loss anaemia due to tick infestation, the presence of protozoa in the red blood cells of animals may also lead to anaemia (Nazifi *et al.* 2011).

Based on this study, we found that some of the farms do not have proper deworming records for controlling helminthiasis and are therefore unable to evaluate anthelmintic efficacy on their farm. According to Chandrawathani *et al.* (2013), anthelmintic resistance is an issue to be addressed in farms with animals that are treated with anthelmintics but still exhibit helminthiasis problems. Coccidiosis should be properly controlled due to its impact, which might cause poor nutrition in animals and indirectly reduce production. Furthermore, according to Jalila *et al*. (1998), the intensity of coccidiosis infestation was found to be related to the cleanliness level.

Helminthiasis, coccidiosis and theileriosis may cause a wide range of clinical signs in goats and sheep including fever, diarrhoea, anaemia, dehydration, inappetence, weight loss, emaciation and sometimes death (Muhammad *et al.* 1999; Kahn *et al.* 2005). Good management practices play a major role in preventing and reducing the occurrence of parasitic infestation in farms. Improving the cleanliness of the facilities, pastures, pens, feeding and water sources will minimise the incidence of infestation. Furthermore, animal stress due to high density and overcrowded pens may also encourage helminthiasis and coccidiosis. In theileriosis, Dolan (1989) reported that acaricides may play a role in controlling the tick infestation that can transmit *Theileria* spp. from one animal to another.

The control of parasitic infestations in small ruminant farms is very important, as healthy animals will increase production, reduce costs for treatment, directly increase domestic mutton production and indirectly increase farmers' profit.

CONCLUSION

Based on the results of this study, helminthiasis, coccidiosis and theileriosis were found to be the common parasitic infestations in small ruminant farms causing high mortality and morbidity in Perak, Malaysia. Concerted efforts need to be taken to improve productivity and to safeguard food quality as drugs may be used rampantly to control these infections in high-density, overcrowded pens that encourage these diseases. The proper usage of anthelmintics and coccidiostats and the implementation of tick control on farms will help in controlling parasitic infestations.

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