OCCURRENCE OF PARASITIC INFECTION IN SMALL RUMINANTS FROM VARIOUS FARMS IN PERAK, MALAYSIA

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ABSTRACT. This is a retrospective study reporting on the occurrence of parasitic infection in goat and sheep in Perak, Malaysia. The parasitic infections were caused by blood parasites and/or intestinal parasites. In 2016, a total of 596 samples were received in which 243 blood samples and 151 faecal samples were from goat whereas 164 blood samples and 38 faecal samples were collected from sheep. The blood samples were subjected to thin blood smear examination in order to determine the presence of blood protozoa while faecal samples were subjected to the McMaster faecal egg counting method to estimate the load of helminth eggs. There were three types of intestinal parasites found in this study namely coccidia, strongyles and *Moniezia* sp. whereas *Theileria* sp. were the only blood parasites detected in both animals. Generally, the percentage of parasitic infection was higher in goats (87.2%) as compared to sheep (68.3%)**.** It was found that there was a high significant difference ($p<0.05$) in intestinal and blood parasites between goat and sheep. This study showed that the positive cases of parasitic infection were greater in goat than in sheep. As a conclusion, it was also found that goat was more vulnerable to intestinal parasites than blood parasites compared to sheep.

Keywords: parasitic infection, prevalence, small ruminant, Perak

INTRODUCTION

The reported statistics on animal husbandry 2016-2017 by the Department of Veterinary Services (Jabatan Perkhidmatan Veterinar, 2018) showed that there were about 431,651 goat and sheep in year 2015 and 446,854 in 2016 in Peninsular Malaysia. The production of livestock products for goats and sheep declined from 4,853 tonnes (2016) to 4479 tonnes (2017). In year 2016, 33.48 tonnes of mutton products were imported to meet the country's needs. These figures show that the production of livestock product is unable to satisfy the local demand (Mohamed *et al.,* 2013). According to von Broun *et al.* (2008), livestock, a major source of animal protein is very important for the Malaysian population. However, Malaysia is still struggling to meet the high demand from consumers. Hence, in order to achieve this goal, the Department of Veterinary Services Malaysia (DVS) had listed a number of programmes to reduce mortality among small ruminants. One of the programmes was to control and eradicate important diseases, including parasitic infection.

The common gastrointestinal (GI) parasites found in goat and sheep in Malaysia are *Haemonchus contortus*, *Trichostrongylus* spp., *Oesophagostomum*

spp., *Cooperia curticei*, *Strongyloides papillosus*, *Paramphistomum* spp. and *Eurytrema pancreaticum* (Shanta, 1982; Sani *et al.,* 1985; Sani *et al.*, 1986; Amin-babjee *et al.,* 1990; Wahab and Adanan, 1993; Premaalatha *et al.,* 2014). Recently, Tan *et al.* (2017) found GI parasites namely, strongyle, *Moniezia* spp., *Paramphistomum* spp., *Strongyloides* spp., *Dicrocoelium* spp., *Trichuris* spp., *Eimeria* spp., *Entamoeba* spp., *Giardia* spp. and *Cryptosporidium* spp. in which more than half of the collected samples were infected with strongyle with the prevalence of 57.7%. In Malaysia, gastrointestinal nematodiasis, referring mainly to haemonchosis was classified as one of the most important causes of mortality and morbidity in small ruminants (Nor-Azlina *et al.,* 2011). According to Dorny *et al.* (1995), *H. contortus* and *Trichostrongylus* spp. were the most important strongyles in sheep and goat. Infection usually occurs primarily through contaminated feed and water linked to poor hygiene (Gatongi, 1996). Opara *et al.* (2005), Mbuh *et al.* (2008) and Terefe *et al.* (2012) discovered that up to 95% of small ruminant were reported to show helminth infestation in tropical countries. Coccidiosis, another GI infection caused by *Eimeria* sp., is one of the most common and economically important diseases of goat (Soulsby, 1982). McDougald (1979) reported that, goats and sheep harbour their own species of *Eimeria* sp. and there is no cross-infection. Theileriosis which is caused by the blood parasites *Theileria lestoquardi*, *T. ovis* and *T. separata* is another parasitic infestation that infects goat and sheep (Altay *et al.,* 2007). Theileriosis is one of the widespread protozoan infections transmitted by ticks of the family Ixodidae (Gamal and El-Hussein, 2003). A study by Kho *et al.* (2017) showed that *Theileria* DNA was detected in 90.0% of 40 sheep while Fazly Ann *et al.* (2015) found this blood protozoa in 25 (14.30%) out of 175 animals.

The pathological problems associated with gastrointestinal helminths include anaemia, diarrhoea, weight loss, oedema, recumbency and consequently, severe debility and finally death (Forse, 1999). Thus, the aim of this study was to determine and compare the positive cases of parasitic infection of goats and sheep in Perak, Malaysia. Through this study, future planning can be identified either in providing proper treatment or prevention to overcome this infection problem.

MATERIALS AND METHODS

Samples

Blood and faecal samples from sheep and goats were sent to the Veterinary Research Institute (VRI) for parasitic diagnosis from January to June 2016. These animal samples were from various farms in Perak state and managed by the DVS of Perak or from a private farm. All samples were received from Infoternak Farm, Sungai Siput, Kuala Kangsar and several private farms located in Manjung, Taiping, Teluk Intan and Sungkai. A total of 596 samples (189 faecal and 407 bloods) from 394 goats and 202 sheep were examined (Table 1).

Table 1. Number of blood and faecal samples obtained from goat and sheep

	Goat	Sheep
Blood	243	164
Faecal	151	38
Total no. of sample from each animal	394	202

Parasitology procedures

Thin blood smear examination

A small drop of blood sample was placed on a clean slide. A new clean slide known as spreader was then held at a 45° angle to the first slide and allowing the drop of blood to spread at the edge of the spreader. The spreader slide then pushed forward quickly and evenly. The smear on the slide was allowed to air dry, fixed with 70% methanol and stained with Giemsa stain at pH 7.2 (Schmidt and Roberts, 1985).

McMaster egg counting technique

The McMaster technique is the most widely employed method for counting helminth eggs in faecal samples. About 3 to 4 grams of faecal samples were weighed and placed into a container. Approximately 45 to 60 millilitres of sodium chloride was mixed with the sample and the suspension was then filtered. A sub-sample of the faecal suspension was then pipetted and filled into a McMaster counting chamber. Sub-sample of the filtrate was examined under a microscope at 100× magnification (Christopher *et al.,* 1992).

Statistical Analysis

Data were analysed using Pearson chi-square test at $p<0.05$ via IBM SPSS Version 22.0 software (IBM Corp.). Chi-square test was used to assess association between the prevalence of intestinal and blood parasitic infection in goats and sheep examined.

RESULTS AND DISCUSSION

Results showed that about 86% (130/151) and 50% (19/38) of goats and sheep respectively, were positive with intestinal parasites. In contrast, the positive number for blood parasites infection were lesser. For blood parasites, results indicated that 1.2% (3/243) of goat and 18% (30/164) of sheep were positive. The overall parasitic infection in goat and sheep were 87.2% and 68.3% respectively. Both goat and sheep have different rates of parasitic infection. Analysis showed that goats have higher intestinal parasitic infection compared to sheep. In addition, the percentage of intestinal parasitic infections (86%) detected in goat was higher compared to blood parasite (1.2%). Inversely, infection between blood parasites and intestinal parasites are almost equal in sheep (Table 2). The chi-square test indicated that the intestinal ($\chi^2 = 23.7$, $p<0.05$) and blood ($\chi^2 = 38.2$,

Table 2. Percentage of intestinal and blood parasites in goat and sheep.

Parasites	Goat Percentage (%) (No.of positive/No. of samples)	Sheep Percentage (%) (No.of positive/No. of samples)
Intestinal parasites	86.0 (130/151)	50.0 (19/39)
Blood parasites	1.2 (3/243)	18.3 (30/164)
	87.2	**68.3**

Table 3. Overall positive cases of intestinal and blood parasites in goats and sheep.

Animals	Total no. of faecal samples examined	Intestinal Parasites			Total no. of blood samples examined	Blood Parasites		
		No. of positive cases	%	χ^2 (*p*-value)		No. of positive cases	%	χ^2 (*p*-value)
				23.7				38.2**
Goat	151	130	86	(*p*<0.05)	243	3	1.2	(*p*<0.05)
Sheep	38	19	50		164	30	18.3	

Table 4. Species wise positive report of intestinal and blood parasites in goats and sheep.

	Goat	Sheep
Theileria sp.	1.2	18.2
Coccidia	64.2	21.1
Strongyles	64.9	49.4
Moniezia sp.	1.3	0

Table 5. Positive cases of parasitic infection in goat and sheep.

	χ^2 values			
	***Theileria* sp.**	**Coccidia**	**Strongyles**	***Moniezia* sp.**
Animals	**(*p*<0.001)**	**(*p*<0.001)**	**(*p*<0.001)**	**(*p*=0.310)**
Goat & sheep	50.7	39.3	21.7	1.029

$p<0.05$) parasitic infection was significantly associated in goats (Table 3).

Faecal samples examination reveals that there were three types of intestinal parasites namely coccidia, strongyles and *Moniezia* sp. The highest infection of intestinal parasites for both animals were strongyles and coccidia. Goats showed an infection rates of 64.9% and 64.2%, whereas sheep were 49.4% and 21.1%, respectively for strongyles and coccidia. The lowest rates of intestinal parasites infection in goats was *Moniezia* sp. (1.3%) and none was detected in sheep.

Examination of the blood samples showed that, both animals were infected with *Theileria* sp. Generally, *Theileria* sp. infection was higher in sheep as compared to goats with occurrence of 18.2% and 1.2% respectively (Table 4). Chi-square test showed that there was high significant difference ($p<0.001$) of *Theileria* sp., coccidia and strongyles infection in goat and sheep. However, there was no significant difference for *Moniezia* sp. ($p= 0.310$) was observed between goat and sheep (Table 5).

The finding of this study showed that the positive cases of parasitic infection were higher in goats than sheep similar with the finding by Pawel *et al*. (2004) and Saiful Islam and Taimur (2008). It was postulated that goats acquire a lower level of immunity against parasitic infection and susceptible to reinfection during their earlier life span. However, Solomon-Wisdom *et al*. (2014) reported that parasitic infection especially gastrointestinal parasites were higher in sheep compared to goats because sheep has lower immune system than goat, especially those reared under traditional methods of husbandry, with harmful effect to host health and additional stress of malnutrition in countries such as Nigeria. Rohaya *et al.* (2017) in their study of common blood parasites in ruminants from 2011-2015 showed that blood protozoa are much higher in goat and sheep except in year 2011. On the other hand, Tiong *et al.* (2014) reported that *H. contortus* and *T. briformis* were dominant in goat compared in cattle, deer and swine. According to Pawel *et al*. (2004), compared to sheep, which develop a strong natural immunity around 12 months of age, goats acquire a lower level of immunity to gastrointestinal parasites. This can result in goats having greater populations of adult parasites with high egg output. This variation may be due to dissimilarities in local ecosystem as well as agro climatic condition which is essential for development of infective larvae.

In this study, the most common parasites found in goats and sheep were strongyles. This is similar with finding by Dorny *et al.* (1995) which conducted a study on three farms in peninsular Malaysia and found that *H. contortus* and *Trichostrongylus* spp. were the most important strongyles in sheep and goats.

Interestingly, *Moniezia* sp. was found only in goat and absent in sheep in present study. This is in line with previous studies by Choubisa and Jaroli (2013), Fagbemi and Dipeolul (1983) which discovered a higher *Moniezia* sp. infection in goats compared than in sheep. The higher incidence of Moniezia infection in sheep as compared to goat can be explained on the basis of the grazing-browsing behavior of sheep and goats (Carew *et al.,* 1980). Sheep graze more and therefore ingest more oribatid mites

on pasture than goats which graze less but browse more and scavenge to a greater extent. The relationship between grazing and *Moniezia* infection had been revealed by Stoll (1937) who showed that there was a rising rate of *Moniezia* infection in sheep during spring, which was concomitant with increased grazing by sheep. The absence of *Moniezia* sp. in this study could be due to the smaller number of samples obtained in sheep as *Moniezia* sp. infestation was common and often causes massive mortality among young animals or less number of their intermediate host; infected soil mites (Oribatidae) (Shumakovich, 1968).

For blood parasites, several studies by other researchers discovered that, sheep are prone to *Theileria* sp. infection compared to goats and that result is parallel with the current study. Nausheen *et al.* (2010) reported that *Theileria piroplasms* in sheep was 7.36% and in goats was 3.8%. Similarly, Altay *et al.* (2007) also found that sheep has higher infection of *Theileria* sp. with 18.29% whereas only 2.88% of the infestation was in goats. According to Amuamata *et al.* (2012) and Yishak *et al.* (2015), the higher prevalence of ectoparasites in sheep than in goats could be attributed to the better body habit of self-grooming, licking, scratching, rubbing and grazing behavior in goats, which could contribute to rapid ectoparasites elimination.

CONCLUSION

Through this study, it was found that goat is more vulnerable to intestinal parasite than blood parasites as compared to sheep. In contrast, sheep has significantly higher occurrences of blood parasites than goats. Due to high positive cases of infection, especially in goats, treatment and prevention must be diligently enforced to control the occurrence of worm burden whereby severe protozoa infestation can affect the quantity and quality of mutton production. Through this finding, hopefully, more efforts in raising awareness of eradicating parasitic infection especially in goat will be done. However, control measures against parasitic infection among sheep should not be taken lightly in order to prevent the spread of diseases.

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