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Original Article

# Seasonal prevalence of gastrointestinal parasitic infections in goats in a commercial farm Kuantan, Malaysia

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## Abstract

Gastrointestinal parasitic infection is a major concern to livestock sector as it causes severe diseases and death to the goats. This study was designed to measure the occurrence of gastrointestinal parasitic infections in goats and its association with the seasonal variations in a commercial farm located in Kuantan, Malaysia. A total of 480 faecal samples were collected randomly from 40 goats in 12 months. All samples were processed under faecal flotation technique for morphology and size of the egg/oocyst of parasites and McMaster modified technique for the OPG/EPG of parasites. Coproculture examination was performed to identify the species of strongyles infected goats in the present study. The obtained data were analysed by using SPSS software under independent t-test and chi-square test. Out of 480 faecal samples, 429 samples were positive and give the overall prevalence 89.4%. The infection rate was significantly higher in a dry climate (92.1%) than wet climate (85.5%). The mean egg counts of strongyles, *Strongyloides* and *Enterobius* were significantly higher in a dry climate than wet climate ($P<0.005$). Meanwhile, the mean egg or oocyst counts of *Trichuris*, *Moniezia* and *Eimeria* were higher in wet climate than dry climate, but the results were not significant. The findings from the present study suggested that appropriate preventive measures such as maintaining cleanliness and provide appropriate anthelminthic to goats need to be applied to the goats, farms and farm workers to prevent the widespread of infections to goats and humans.

**Keywords**: Gastrointestinal parasitic infection, Goats, Seasonal, Livestock, Malaysia

## Introduction

Although small ruminant production has been integrated as one of the agricultural activity in Malaysia for many years, this sector is relatively minor compared to other livestock sectors (Hashim, 2017). Recently, goat's population had shown a rapid growth over 875.5 million heads and Asia had the largest goat population especially in China, India, Malaysia and Pakistan (Yusof and Isa, 2016). In Malaysia, a total number of goats reared in 2014 was 388,575 (Department of Veterinary Services (DVS), 2015). In the livestock sector, a total number of goats reared in Malaysia was the second highest after cattle. The main purposes of goat rearing in Malaysia are for meat and

milk production and as a source of income. Preference for goat meat has gradually increased due to its low in saturated fat and total fat compared to other meats such as lamb, beef, chicken and pork (Yusof and Isa, 2016). In 2005 to 2014, the consumption of mutton had increased from 16,973 metric tonnes to 34,935 metric tonnes (DVS, 2015). These statistics proved that the public demand for mutton had increased from year to year in Malaysia. According to Zainalabidin et al. (2015), when the population of goat increases to 1.5 million heads, the mutton's production was assumed to increase from 8.99% to 35.00%.

Gastrointestinal parasitic infection is a major concern for public health as this infection causes severe and direct damages to ruminants (Yusof and Isa, 2016). Gastrointestinal parasitic infections in goats usually occur through contaminated water and food as well as accompanied by poor hygiene of management system (Sultan et al., 2016). In Malaysia, common endoparasites found in goats and sheep are *Haemonchus contortus*, *Trichostrongylus* spp., *Oesophagostomum* spp., *Cooperia curticei*, *Strongyloides papillosus*, *Paramphistomum* spp., and *Eurytrema pancreaticum* (Hashim, 2017). It was reported that affected animals usually have a rough dull-coat, apathy, diarrhea, weakness, submandibular edema, tail rubbing, hypoproteinaemia, weight loss, loss of appetite and may end in death (Zvinorova et al., 2016).

Pahang is located in the East Coast region of Malaysia. Kuantan which is the main capital of Pahang received maximum rainfall during annual monsoon season. In Malaysia, there are two main seasons which are the dry season and the wet season. The occurrence of gastrointestinal parasitic infections was higher in a wet and rainy season than dry season. In the rainy season, pre-parasitic stages depend mainly on the optimum temperature and moisture to develop and survive. Low temperature and high humidity during wet season stimulate the development and survival of helminths eggs and protozoa cysts into infective stage (Velusamy et al., 2015). The humidity also favour larval development in vegetation by preventing the larvae from drying out (Mignatti et al., 2016). Environmental conditions that are too dry or too hot can prevent the larvae from developing into infective stages on pasture (Hernandez et al., 2013).

In Malaysia, there were several studies have been done on the occurrence of gastrointestinal parasitic infection in goats (Abubakar et al., 2015, Basripuzi et al., 2012, Hashim, 2017, Khadijah et al., 2014, Zainalabidin et al., 2015) but none of the studies had been done in Kuantan, Pahang and focuses on the association between different sampling seasons and occurrence of gastrointestinal parasitic infections in goats. Hence, this study aimed to measure the association between different sampling seasons and the occurrence of gastrointestinal parasitic infections in goats in a commercial farm, Kuantan, Malaysia.

## Material and Methods

This study had obtained ethical approval prior the faecal samples collection from Institutional Animal Care and Use Committee (IACUC), International Islamic University Malaysia (IIUM). All the procedures during faecal samples collection were done according to standard operating procedures given by IACUC. Faecal samples collection was conducted from January 2016 to December 2016 at a commercial farm, located in Panching, Kuantan (GPS coordinate: 3.844755, 103.143158). The climate of Kuantan was a constant temperature, heavy rainfall and high humidity. The minimum temperature in Kuantan is 24.6 °C and the maximum temperature is 35.5 °C. Kuantan's humidity is 63% and the average annual rainfall is 2887 mm. The climate of Peninsular Malaysia is described for four seasons which are northeast monsoon, southwest monsoon and two periods of inter-monsoon. The dry season in Kuantan started from April until October. Meanwhile, the wet season started from November until March. The climatic data were obtained from Malaysian Meteorological Department (2016).

A total of 480 goat faecal samples were collected directly from the rectum of 40 goats. Forty goats were chosen randomly from the farm and the faecal samples were collected from the same goat in each month. The faecal container was labelled and transported to the Infectious Diseases Laboratory, IIUM for sample processing. Faecal flotation technique was done by using saturated sodium chloride to identify the presence of eggs or oocyst of parasites. Three grams of each faecal sample was weighed and mixed with 45 ml of saturated sodium chloride (NaCl). The mixture was grounded by using pestle and mortar. The mixture was filtered by using a strainer. One drop of the filtered mixture was put onto the glass slide. Then, the glass slide was examined for the size and morphology of the oocysts or eggs of parasites by using a light microscope under 400X magnification (Gebeyehu et al., 2013). Further coproculture examination had been

performed to identify the strongyles species infected goats in the present study. The coproculture examination had been done based on the morphological appearance and size of eggs (Kelemework et al., 2016). The faecal samples also were examined under Modified McMaster Technique. Three grams of each faecal sample was weighed and mixed with 45 ml NaCl. The mixture was grounded by using pestle and mortar. The mixture was filtered by using a strainer. The counting of oocyst per gram or eggs per gram (OPG/EPG) of parasites was done by using McMaster chamber under a light microscope at 100X magnification (Gebeyehu et al., 2013). Statistical analysis was done by using Statistical Package for the Social Sciences (SPSS) software for Windows (version 12.0.1). The overall prevalence of parasitic infection and the prevalence of different species of helminths and protozoa were calculated as a percentage. Independent t-test was used to analyze the OPG and EPG of the parasites and to measure the differences among sampling seasons (dry and wet). The differences were referred to as significant if the P-value is lesser than 0.05.

## Results

**Prevalence of gastrointestinal parasitic infections in dry and wet season**

A total of 480 faecal samples were collected from a commercial farm in Kuantan, Pahang. The present study revealed that out of 480 goat faecal samples, 429 samples (89.4%) were positive for gastrointestinal parasites. The highest prevalence of gastrointestinal parasites with the percentage of 92.1% (258/280) in the dry season. Meanwhile, the lowest prevalence of gastrointestinal parasites with the percentage of 85.5% (171/200) in the wet season. There is a significant association between seasonal variations and the occurrence of gastrointestinal parasitic infections in goats ($P<0.05$).

**Prevalence of gastrointestinal helminths and coccidian in goats**

Table 1 presented the prevalence of gastrointestinal helminths and coccidian in goats in a commercial farm in Kuantan. The helminths species found in the present study were strongyles, *Strongyloides*, *Trichuris*, *Enterobius*, and *Moniezia* while only one coccidian species found from the samples which was *Eimeria.* From Table 1, *Eimeria* was the predominant parasite found in goats with the percentage of 88.8% (426/480). Other species found were *Moniezia* (10.2%), *Enterobius* (10.0%), *Trichuris* (0.4%), strongyles (2.7%) and *Strongyloides* (1.3%). The coprocultural examination of strongyles species revealed that, there were two species of strongyles found in goats which were *Haemonchus* with 1.7% and *Trichostrongylus* with 1.0%.

**Mean counts of *Eimeria* oocysts and gastrointestinal helminths egg per gram in dry and wet season**

The OPG/EPG of gastrointestinal parasites are summarized in Table 2. Based on Table 2, egg counts for strongyles, *Strongyloides* and *Enterobius* were significantly higher in a dry climate than wet climate ($p<0.050$). For *Trichuris*, *Moniezia* and *Eimeria*, the eggs/oocysts counts were higher in wet climate than dry climate but the result was not significant.

**Table -1: Prevalence of gastrointestinal helminths and coccidian in goats.**

| Species of parasites | Total number examined | Number infected | Percentage (%) |
|---|---|---|---|
| Strongyles | 480 | 13 | 2.7 |
| *Haemonchus* | 480 | 8 | 1.7 |
| *Trichostrongylus* | 480 | 5 | 1.0 |
| *Strongyloides* | 480 | 6 | 1.3 |
| *Trichuris* | 480 | 2 | 0.4 |
| *Enterobius* | 480 | 48 | 10.0 |
| *Moniezia* | 480 | 49 | 10.2 |
| *Eimeria* | 480 | 426 | 88.8 |

**Table - 2: Mean counts of *Eimeria* oocysts and gastrointestinal helminths egg per gram in dry and wet season.**

| Species of parasites | Dry (n=280) | | Wet (n=200) | | P-value |
|---|---|---|---|---|---|
| | Mean EPG | Mean OPG | Mean EPG | Mean OPG | |
| Strongyles | 2.68 ± 15.895 | | 0.50 ± 4.987 | | 0.032** |
| *Strongyloides* | 1.25 ± 8.893 | | 0.00 ± 0.000 | | 0.019** |
| *Trichuris* | 0.18 ± 2.988 | | 5.00 ± 7.071 | | 0.497 |
| *Enterobius* | 16.61 ± 65.041 | | 5.00 ± 24.556 | | 0.007** |
| *Moniezia* | 47.14 ± 336.957 | | 72.00 ± 428.907 | | 0.478 |
| *Eimeria* | | 806.07 ± 1181.927 | | 823.50 ± 1182.025 | 0.874 |

P-value of less than 0.05 (**) was considered statistically significant (**P<0.05).

## Discussion

Finding in the present study revealed that the overall occurrence of gastrointestinal parasitic infection in goats in a commercial farm, Kuantan, Pahang was 89.4% (429/480). The findings in this study corroborate with the previous studies done by Singh et al. (2015) and Nath, et al. (2011) that showed a high prevalence of parasitic infection in goats with the percentage of 94.48% and 81.5%, respectively. The high occurrence of parasitic infection in goats may be attributed to poor management practices at the farm, lack anthelminthic treatment and lack veterinary care (Koinari et al., 2013, Sugun et al., 2015). However, the present study is not in agreement with the previous studies done by Apio et al. (2011), Ayaz et al. (2013) and Velusamy et al. (2015). Previous studies showed the lower occurrence of parasitic infections in goats with the percentage of 14.29%, 52% and 35%, respectively. The present findings showed that the intensity of parasitic infection was higher in the dry season compared to the wet season. The result of the present study was not in agreement with several previous studies done by Gwaze et al. (2010), Lone et al. (2012) and Sutar et al. (2010). Previous studies found a lower occurrence of parasitic infections in dry season than wet season. The higher prevalence rate in dry season might be due to body condition, diet, uneven sampling age or classes and a longer period of the dry season than wet season (Soliman and Zalat, 2003). Besides that, poor farm management applied by farmers such as non-hygienic pens, compact environment, late kidding and large herd size increases the intensity of parasitic infections in goats (Giadinis et al., 2012).

The findings showed that *Eimeria* was the predominant parasite found in goats at the farm. The findings from this study were similar to previous studies done by Hashim and Yusof (2016) and Velusamy et al. (2015) that found the highest prevalence rate of *Eimeria* infection than helminths infection. The higher rate of *Eimeria* infection in goats might be due to special characteristics of *Eimeria* oocyst that can survive in extreme environmental conditions compared to helminth's eggs as proposed by Hisamuddin et al. (2016). Besides that, small and contaminated pens lived by the goats in the present study promotes continuous coccidian infections in goats (Ratanapob et al., 2012). Based on the present study, the helminths that found in this study were *Moniezia*, *Enterobius*, *Trichuris*, strongyles and *Strongyloides*. The infection rate of *Moniezia* in this study was higher than other helminths with the percentage of 10.2% (49/480). Moreover, the prevalence rate of helminths was lower than coccidian infection. The lower infection rate of helminth infections in goats might be due to the application of flotation technique that unable to capture all eggs/oocysts in the samples. Besides that, helminths normally shed only one or two eggs in every reproduction cycle compared to protozoa that shed millions of eggs in every reproduction cycle (Apio et al., 2011).

From the findings, mean egg counts for strongyles, *Strongyloides* and *Enterobius* were significantly higher in dry climate than wet climate (P<0.005). Finding in this study was similar to a previous study done by Nath et al. (2011) that found a higher intensity of helminths infections in dry season. The findings from the present study might be due to continuous nematode infections from one season to another season that leads to the continued presence of worms in the animals even during dry season. In addition, a favourable environmental condition in the farm favoured the growth and survival of infectious stages of the nematodes larvae (Radfar et al., 2011). The

present study showed that mean oocyst counts for *Eimeria* were higher in wet season than dry season but the result was not significant. The finding from the present study might be due to a higher rate of rainfall and lower temperature during wet season that reduce the resistance of goats to infections (Sutar et al., 2010). Heavy rains and lower temperature also favour oocyst sporulation of *Eimeria* (Kheirandish et al., 2014).

In conclusion, based on the findings, there was a high occurrence rate of gastrointestinal parasitic infections in goats and parasitic infections were significantly associated with seasonal variation. The findings suggested that proper management control needs to be applied to the goats, farms and farm workers. An appropriate preventive measure such as maintaining cleanliness and provide appropriate anthelminthic to goats should be taken to prevent the widespread of infections to goats and humans since the infected goats may become potential carriers of parasitic infection to other animals and human especially goat handlers. For future study, the researchers can perform coproculture analysis to identify the species of strongyles that infected the goats in order to increase the reliability of the results.

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