PREVALENCE OF HELMINTHIASIS IN RELATION TO CLIMATE IN SMALL RUMINANTS IN PERAK IN 1998 AND 2008

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ABSTRACT. This is a prevalence study of the correlation, pattern and comparison of helminthiasis cases in small ruminants in relation to the weather conditions in Perak in the year of 1998 and 2008. Helminthiasis is annually diagnosed at the Parasitology Unit of VRI. Due to the global warming and climate changes, there is a need to know the effects of weather, if any, on the increasing trend of helminthiasis cases diagnosed in the districts of Perak. The methods applied for the diagnosis of helminth in faecal samples from sheep and goats were McMaster, floatation and larvae culture methods. In this study, animals with faecal egg counts (FEC) of 500 e.p.g and above are considered as positive helminth cases. Rainfall data is correlated to the farm location in each district and further analysed according to parasitological status. Generally, humidity and rainfall are high throughout the year, however, further analysis of data does not show significant correlation between helminthiasis and rainfall in the state. High humidity conditions contribute to the survival of infective larval stage of helminths such as *Haemonchus contortus* and this may be the cause for high helminthiasis cases in some districts in Perak. Comparison between data in 1998 and 2008 showed higher number of helminthiasis in 2008, which may be due to higher population of small ruminants in that year. Therefore, further research should be conducted to investigate thoroughly the relationship and the effect of weather on helminthiasis. Anthelmintic resistance study is also conducted to help farmers reduce helminthiasis problems in the farms.

Keywords: Helminthiasis, small ruminants, weather, rainfall, FEC

INTRODUCTION

Helminthiasis is considered as one of the most prominent causes of mortality in small ruminants. The most common helminth infection is caused by the Trichostrongyloidea family, namely *Haemonchus contortus.* This is a bloodsucking parasite which causes nutrient deficiency in small ruminants leading to mortality. The current emerging problems of anthelmintic resistance in small ruminants causes severe repercussions by reducing productivity. Epidemiological studies describe that the lower environmental limits for haemonchosis to infect small ruminants is having a monthly mean temperature of 18°C and approximately 50 mm rainfall, thus it has been generally recognized that *Haemonchus contortus* is a parasitic problem to the warm and wet countries where small ruminants are reared (Waller and Chandrawathani, 2005).

The hatching of eggs and survival of the infective stage larvae depends on two most important components of the external environment, which is the temperature and humidity. The optimal temperature for the development of the maximum number of larvae in the shortest feasible time is generally in the range 18-26°C (Taylor *et al*., 2007). The optimal humidity is 100% although some development can occur down to 80% relative humidity, however, even in dry weather where the ambient humidity is low, the microclimate in faeces or at the soil surface may be sufficiently humid to permit continual larval development (Taylor *et al*., 2007).

In the trichostrongyloids, the embryonated egg and ensheathed infective stage of the larvae, L_3 is best equipped to survive in extreme condition whether it be freezing or dessication. The increases in temperature caused by global warming might be expected to have major effects on the abundance of parasites population, through higher rates of development and release of infective stages. This leads to widespread assumptions that as a result of climate change, livestock will tend to suffer from increasing disease and production loss caused by parasites (Morgan and Wall, 2009).

Looking at previous research, there is some correlation between the high prevalence of *Haemonchus contortus* with weather conditions found in other countries with almost similar climate conditions as Malaysia. The research recorded peak infection level during rainy season and low infection levels during dry season (Chaudry *et al.*, 2007). This study was conducted to observe and correlate the trends of climate change in 1998 and 2008 and the effect of the climate change to the prevalence of helminthiasis in the districts of Perak in the year 1998 and 2008.

MATERIALS AND METHODS

In this study, data of positive helminthiasis cases received in the Parasitology and Haematology Unit of Veterinary Research Institute (VRI) for the state of Perak in year 1998 and 2008 were collected and compiled. These data were divided according to the 9 districts in Perak. Meteorological data of the annual temperature, humidity and rainfall in the year 1998 and 2008 were gathered from the Meteorology Department of Malaysia from 9 meteorology stations situated in the districts of Perak. The data include amount of rainfall in millimeter (mm) collected in 24 hour period, mean relative humidity in percent (%) and mean temperature in degree Celsius (°C).

The faecal egg count (FEC) test was conducted to estimate the number of

TABLE 1. Helminthiasis Cases in the Districts of Perak in 1998 and 2008

DISTRICT	1998	2008
Kinta	134	634
Perak Tengah	19	8
Kuala Kangsar	47	342
Manjung	0	13
Batang Padang	0	108
Hulu Perak	7	27
Hilir Perak	10	90
Larut Matang	3	17

TABLE 2. Total rainfall (mm) in the Districts of Perak in 1998 and 2008

DISTRICT	1998	2008
Kinta	2114.8	2935.2
Perak Tengah	2044.7	2741.1
Kuala Kangsar	1834.4	2061.6
Manjung	1048.0	1098.4
Batang Padang	2849.7	3426.4
Hulu Perak	1393.2	1674.0
Hilir Perak	1628.5	1594.6
Larut Matang	3864.6	5146.0

TABLE 3. Small ruminants populations in Districts of Perak in 1998 and 2008

DISTRICT	YEAR	
	1998	2008
Kinta	2,935	3,826
Perak Tengah	1,741	3,728
Kuala Kangsar	3,926	5,621
Manjung	4,534	6,171
Batang Padang	3,885	8,260
Hulu Perak	2,629	2,036
Hilir Perak	3,944	3,326
Larut Matang	5,918	2,545

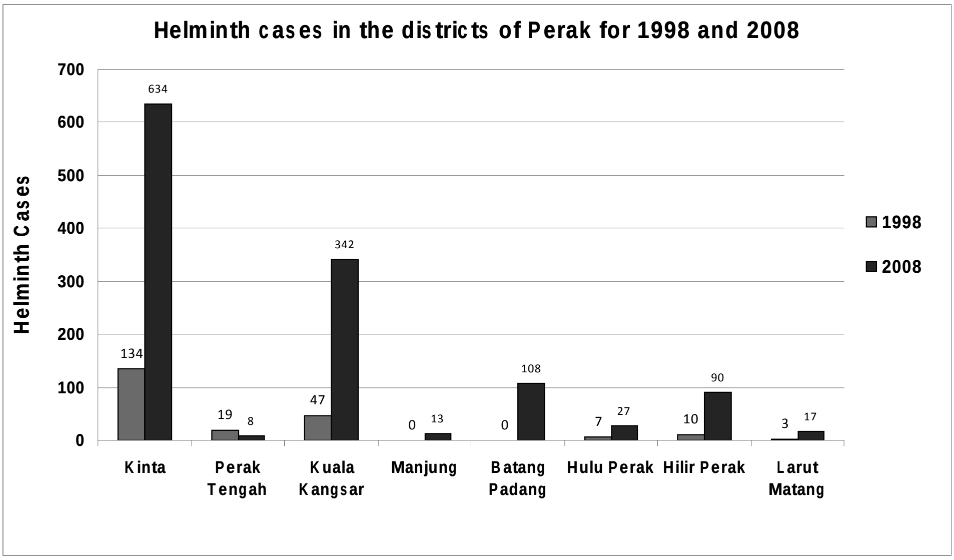

FIGURE 1. Graph of helminth cases in the districts of Perak for 1998 and 2008

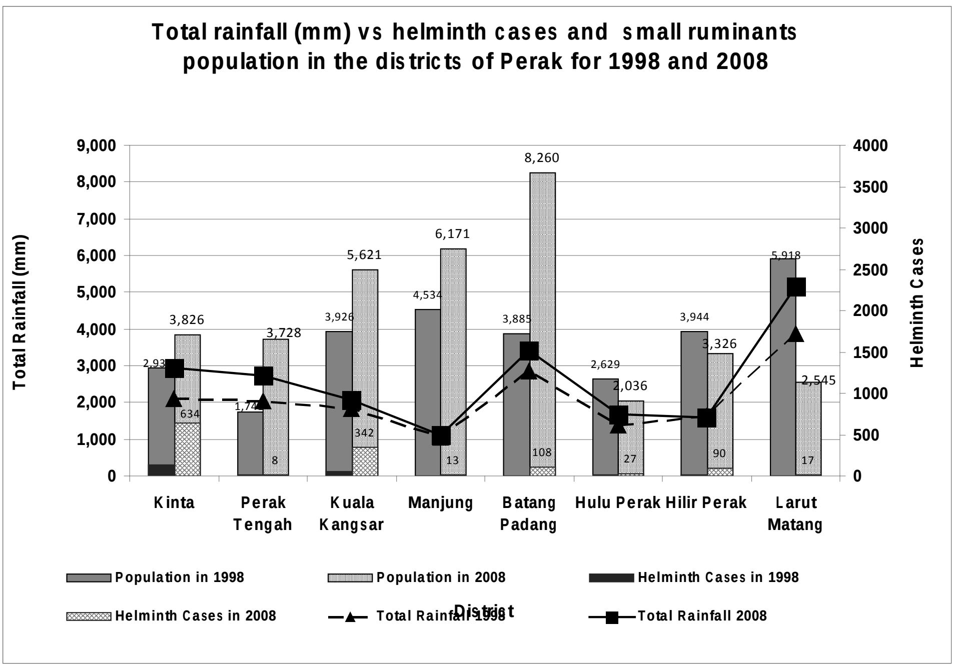

FIGURE 2. Graph of small ruminants population data in the districts of Perak in 1998 and 2008

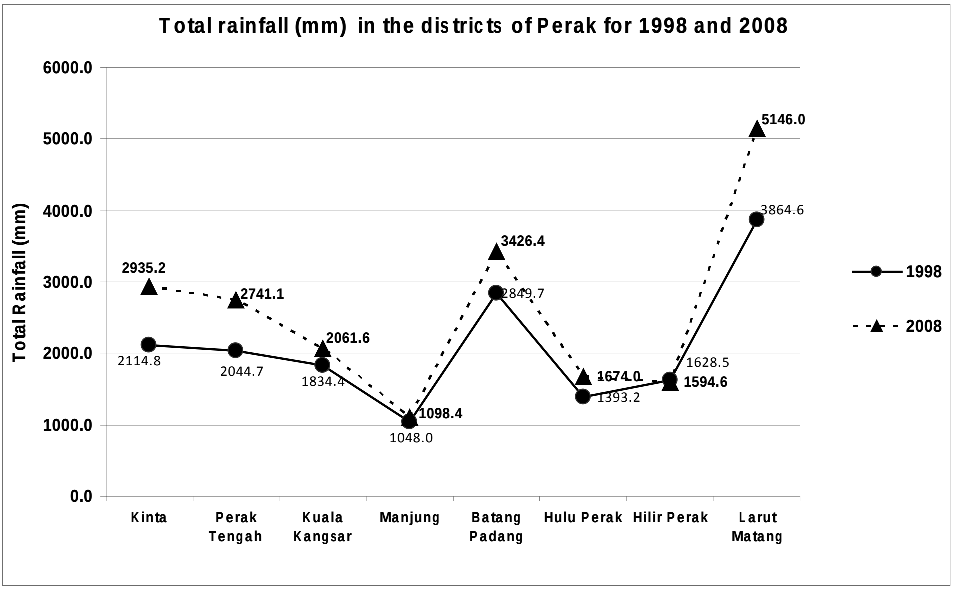

FIGURE 3. Graph of total rainfall (mm) in the district of Perak for 1998 and 2008

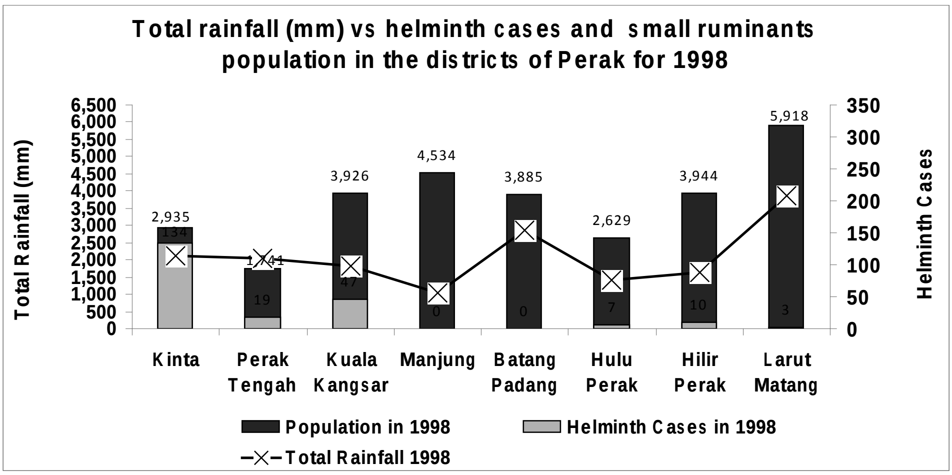

FIGURE 4. Graph of total rainfall (mm) vs helminth cases and small ruminants population in the districts of Perak in 1998

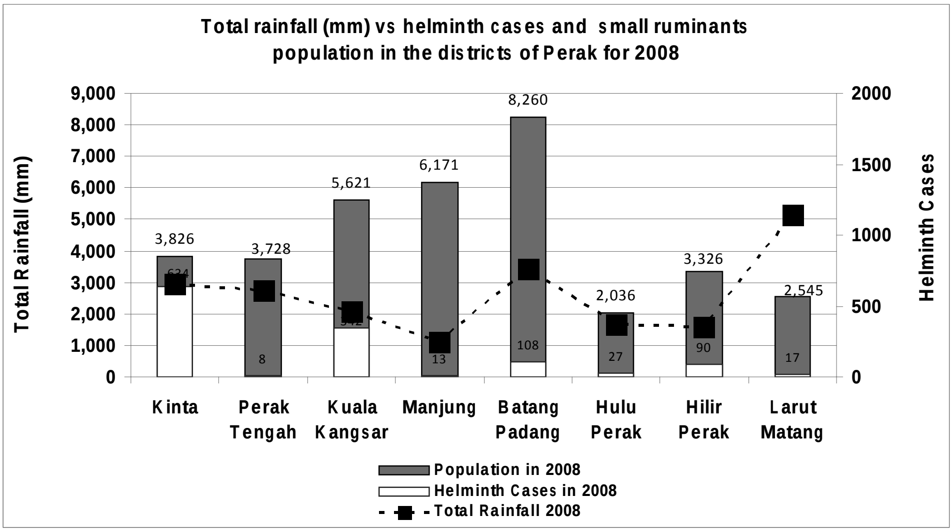

FIGURE 5. Graph of total rainfall (mm) vs helminth cases and small ruminants population in the districts of Perak in 2008

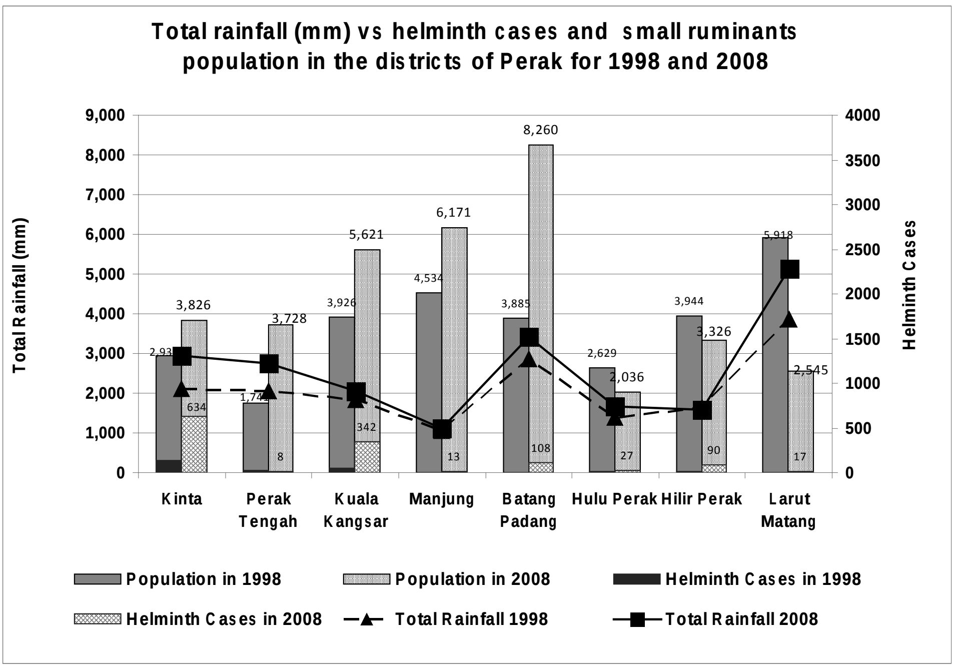

FIGURE 6. Graph of total rainfall (mm) vs helminth cases and small ruminants population in the districts of Perak in 1998 and 2008

egg per gram faeces from the goats and sheep samples received in the Parasitology and Haematology Unit, VRI. This test is a diagnostic tool conducted using the McMaster (Ministry of Agriculture, Fisheries and Food, 1986), floatation and faecal culture methods to detect the helminthiasis problems in small ruminants. Animals with egg counts of 500 epg and above are considered to be significantly infested with helminthiasis where treatment is necessary. The data of helminthiasis cases in each district in Perak in the year 1998 and 2008 were correlated with the meteorology data from the 9 stations according to the district location of each meteorology station in the state of Perak.

RESULT AND DISCUSSION

There was consistent rainfall throughout both years in all districts and a slight increase of rainfall (34-1280 mm) in 2008 compared to 1998 and hence, helminthiasis cases were found throughout the year. Helminthiasis cases in the districts of Perak showed higher cases in the year 2008 compared to 1998 for all districts except for Perak Tengah district. The district of Kinta reported the highest case of helminthiasis in 2008, followed by Kuala Kangsar, Batang Padang and Hilir Perak districts, while in 1998, the district of Kinta still showed the highest case of helminthiasis, followed by Kuala Kangsar, Perak Tengah and Hilir Perak districts. Figure 2 shows small ruminant populations in Perak where higher population were observed in most districts in 2008 compared to 1998. The highest population was observed in Batang Padang district, followed by Manjung, Kuala Kangsar, Kinta and Perak Tengah, while in 1998, highest population was observed in the Larut Matang district, followed by Manjung, Hilir Perak, Kuala Kangsar and Batang Padang. The highest amount of rainfall in both 1998 and 2008 was reported in Larut Matang district, followed by Batang Padang, Kinta and Perak Tengah districts.

While there is no direct correlation observed between the high rainfall and the number of cases with regard to the population of small ruminants in the district, high humidity (77.3%) and moderate temperature (26.5°C) with annual average rainfall of 2097.2 mm (1998) and 2584.7 mm (2008) reported in Perak is favourable to the lifecycle of the strongyle and the survival of the infective larvae (L_3). This causes the infection to occur in the small ruminants after 3-4 weeks of grazing on the infected pasture.

Minute alterations in the local climate patterns or the potential effects of climate change on the epidemiology of helminth parasites and the implications for sheep farming in the Malaysia needs to be studied further. These changes may have implications for the epidemiology of sheep helminth parasites such as the production-limiting disease outbreaks caused by *Haemonchus contortus.*

It has been reported by Kao *et al.* (2000) that additional considerations of the effects of climate and the annual replacement of host stock show that for conditions favourable for parasite transmission, this is a robust indicator of parasite epidemiology. When climate variation and annual replacement are added to the model, it is shown to reasonably describe the qualitative behaviour of an experimental data set, indicating it to be a useful tool for further investigation of some of the underlying assumptions of sheep-nematode dynamics.

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