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Notes on Fenbendazole resistance of Boer goats in a farm in Setiu, Terengganu

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Abstract

Gastrointestinal parasitic infection is a serious threat to small ruminant industry. The control of helminth infection in goat are heavily relied on anthelmintic drugs. However, anthelmintic resistance has emerged as a big threat to the farmers and ruminant industry. Anthelmintic resistance against commonly used anthelmintic; Fenbendazole, was evaluated by using Faecal Egg Count Reduction Test (FECRT) of gastrointestinal (GI) parasites in a farm located in Setiu, Terengganu. GI parasites screening were carried out and a total of 28 animals with high parasites infection (EPG > 1000) were selected and divided into two groups (n= 14, Control vs Treatment). The Treatment group were administered with Fenbendazole (0.1ml/kg body weight) while Control group were leave untreated. Mean percentage reduction of FEC (95% upper and lower confidence limits) for the Treatment group are 32.75 (100 and -83) indicating resistant towards Fenbendazole treatment. The farm is recommended to use and alternate another group of anthelminthic drugs to treat their animals.

1. INTRODUCTION

Gastrointestinal parasites infection possesses major challenge to the small ruminant productions in Malaysia and other place in the world. The damage can be seen directly from mortality and from associated production losses namely from the hypoproteinemia, growth depression, reduction in milk yield, loss of appetite and digestive inefficiency (Azlan et al., 2019). Helminthiasis especially haemonchosis was shown to be the second most important of mortalities in small ruminants (Aziz et al., 2011). While helminths in goat and sheep including *Haemonchus contortus, Oesophagostomum* sp., *Cooperia* sp. and *Trichostrongylus* sp. can cause severe economic losses in the livestock industry (Zainalabidin et al., 2015). Parasite control, especially the control of helminth parasite, has so far predominantly relies upon the use of anthelmintic drugs and it will continue to remain as the cornerstone of helminth control in foreseeable of efficacy.

Anthelmintic drugs such as benzimidazoles, levamisole and closantel are widely used in Malaysian goat and sheep farms to control helminthiasis. However, over the past two decades there have been complaints of the ineffectiveness of these drugs as farmers can buy these easily from veterinary drug distributors. Multiple resistance was reported towards oxfendazole and ivermectin in various small ruminant farms in Sabah, East Malaysia and five small ruminant government farms in Peninsular Malaysia (Chandrawathani et al., 2013). The present study was carried out due to complaint from a farm regarding continues symptoms of helminthiasis in their animals regardless of scheduled administration of anthelmintic drug. Since the farm received bulk anthelmintic drug, Fenbendazole from their headquarters, they have been administrating only Fenbendazole to their animals for years. Thus, this study aims to determine the status of Fenbendazole resistance in the Boer goats in the semi-government farm located in Terengganu, Malaysia by using faecal egg reduction test (FECRT).

2. MATERIAL AND METHOD

2.1. Animals and study sites

The study was conducted in a farm located in Setiu, Terengganu from February to March 2019. 28 goats age around 4 months with average body weight 15 ± 2 kg were screened for gastrointestinal parasites infection. Faeces samples were taken back in ice and examined for gastrointestinal parasites in Microscopy Laboratory, FBIM (UniSZA Besut Campus).

2.2. Prevalence and identification of GIT parasites

For parasites identification, faeces were examined using faecal floatation method and identification were carried out by observation of the ova. Ova was

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differentiated based on its morphological characteristic and shape following Zajac et al., (2012). Prevalence was count by calculating the percentage of infected animals.

2.3. Faecal egg count (FEC) using McMaster slide

Fecal samples were collected directly from the rectum for fecal egg count (FEC) determination. 4 g of faeces have been weighed and placed into 100ml beaker. 56 ml of flotation fluid was poured into the beaker. The mixture is then stirred thoroughly using spatula. The mixture was poured into other beaker and filtered through tea-strainer to reduce big particles for clearer visual in microscopic examination. By using Pasteur pipette, the mixture was filled into McMaster counting chamber and was let to stand for five minutes prior to microscopic examination. The McMaster was place under microscope (Olympus SZ10, Tokyo, 2001) and examined under 10x and 40x magnification. The helminth eggs present in the engraved area of both chambers was counted and calculated (Zajac et al., 2012).

2.4. Antihelminthic (Fenbendazole) challenge

Prior to the experiment, weight and animal identification number were recorded. For the anthelminthic challenge experiment, 28 animals positive with helminth infection (EPG > 1000) were divided into two groups (Treatment, n=14 and Control, n=14). The Treatment group was given Fenbendazole orally according to their weight (10mg/1kg body weight). The Control group were kept untreated. Both groups were housed in wooden pens on a raised slatted floor with no access to the pasture along the 14 days experimental period. Himalayan salt block was provided to the animals and clean water were given ad libitum.

2.5. Fecal Egg Count Reduction Test (FECRT)

To evaluate the resistance against Fenbendazole, Faecal Egg Count Reduction Test (FECRT) was carried out by analysing the FEC after two weeks of treatment. Data on the resistance level (resistant, susceptible or exhibited suspected resistance) was analysed according to Coles et al. (1992). Two criteria—the percentage drop in egg count was less than 95% and the 95% confidence level was less than 90%—were used to determine if resistance to a particular treatment was evident. Resistance was suspected if only one of the two criteria was satisfied (Aziz et al., 2011).

3. RESULTS AND DISCUSSION

3.1. Prevalence and identification of gastrointestinal parasites

All the Boer goats (N=28) screened for GI parasites in this study were infected with one or more parasite species giving a 100% value for GI prevalence. 92% (n=26) of the animals were infected by more than one type of GI parasites (mixed infection) and 8% of the sample shows single type infection. Based on the observation of the ova, three species of GI parasites were identified which are *Trichuris ovis* (Figure 1), *Moniezia* sp. (Figure 2) and *Haemonchus contortus* (Figure 3).

Figure 1: *Trichuris ovis* ova from the fecal sample of Boer goat in a farm in Setiu Terengganu.

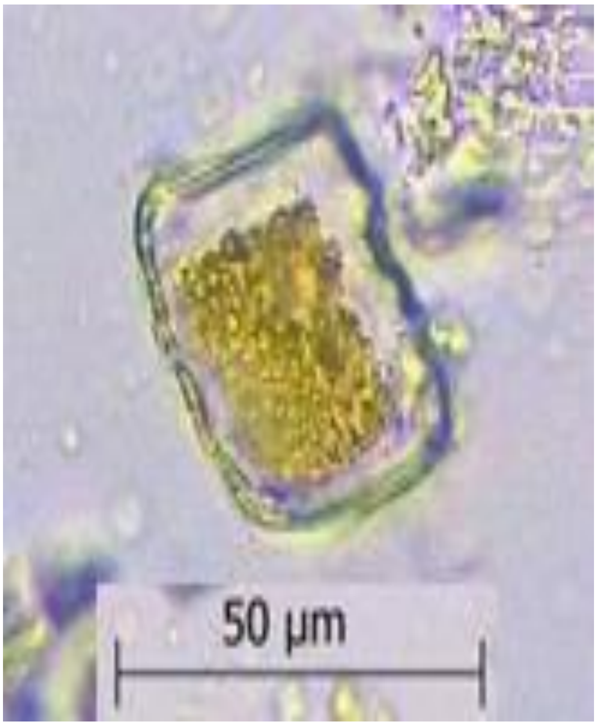

Figure 2: *Moniezia* sp. ova from the fecal sample of Boer goat in a farm in Setiu Terengganu.

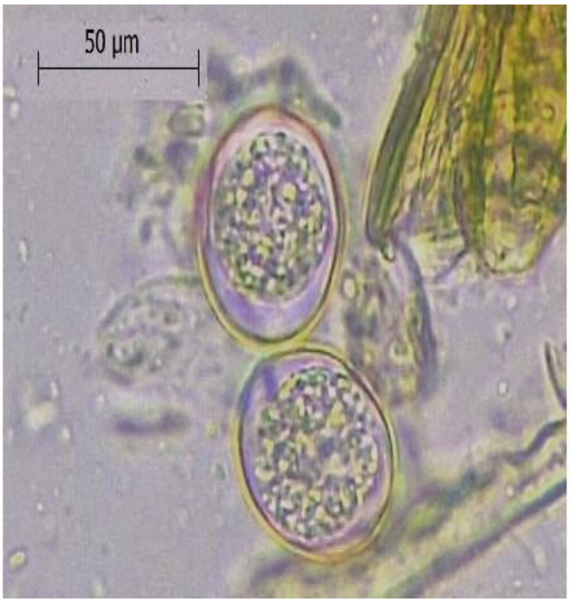

Figure 3: *Haemonchus contortus* ova from the fecal sample of Boer goat in a farm in Setiu Terengganu.

Haemonchus contortus, Trichuris sp. and *Moniezia* sp. are common gastrointestinal parasites of ruminants in Malaysia (Azlan et al., 2019; Paul et al., 2020). *Haemonchus contortus* is known to have the ability to produce thousands of eggs per day and has a relatively short generation interval. They lived and occupied in the abomasum of the goats and has a fiendish ability to suck blood and nutrient from its host. Both larvae and adult worm feed on blood and with constant exposure, it can eventually cause a considerable damage to the stomach tissue (Heath et al, 2003). Meanwhile *Trichuris* sp. or its common name whipworm has direct life cycle. The egg produced by adults in the large intestine are passed in the faeces. The eggs are very resistant to external environmental conditions and can survive for a long time. After minimum 3 weeks in the environment, eggs reach the infective stage and can infect a host when ingested. Clinical disease caused is diarrhoea, but it is rare and usually associated with heavy infestation (Zajac et al., 2012). Infestation by *Moniezia* sp. is rather gentle for adult livestock and cause no apparent clinical sign. Despite that, they also compete for nutrients with the host and their presence can give effect on productivity. Heavy infection may cause reduce growth in young animals. Infection is usually recognized when owners see tapeworms' segments in the animal or in the environment which in size of 65-75μm in diameter (Zajac et al., 2012).

Poor farm management such as unhygienic shelter or contaminated pasture and water may contribute to multiple infections of gastrointestinal helminths species within a goat (Raza et al., 2014). According to Khaijuria et al., (2013), environmental condition such as warm, humid and rainy climate has become an advantage to these species compared to the other helminths Infection with various species of gastrointestinal helminths within a goat is an important additional cause of morbidity and loss of production (Kumsa et al, 2011).

3.2 Faecal egg count (FEC)

Figure 4 shows the mean FEC of Treatment and Control group at Day 1 and Day 14 of the experiment. The Control group mean FEC at Day 1 were 2889±389 and significantly increased to 3457±609 ($p<0.05$) at Day 14. While for Treatment group the mean FEC at Day 1 were 3932± 905 and decreased to 1600±321 at Day 14 ($p<0.05$).

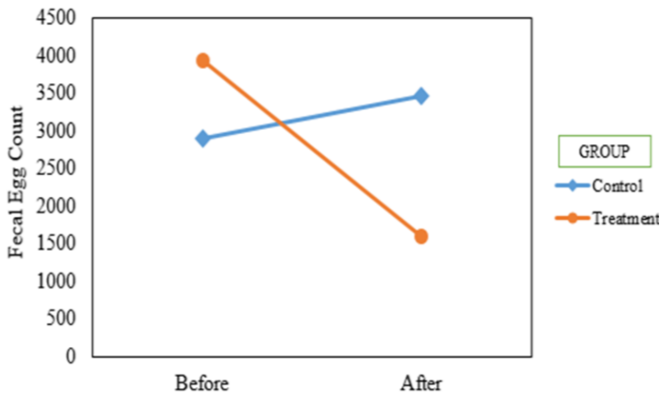

Figure 4: Mean faecal egg count (FEC) of treatment and control group at Day 1 and Day 14 of the experiment.

As control group was not given any treatment, the worm burden increasing over time as there is no hurdle for parasitic helminth to reproduce and growth (Figure 4). The increase in egg count also might cause by the feed intake which is the worm sources are from the pasture. The farm conduct intensive farming. Grass was graze in the morning by using the grazing machine. Study conducted by Abdul Aziz et al., (2011) stated that the morning grazing practice had significantly increased the worm burden in goats compared to the afternoon grazing. This was due to the presence of infective larvae on the dew-laden pasture in the mornings. Infective larvae are sensitive to weather conditions in the morning, as humidity and low degree of sunshine allow the larvae to become abundant on pasture compared to during the evening when the absence of dew prevents the larvae from being present on herbage.

3.3 Fecal Egg Count Reduction Test (FECRT)

Figure 5 shows the faecal egg count reduction test result of individual goat in Treatment group. Mean percentage reduction of FEC (95% upper and lower confidence limits) for the Treatment group are 32.75 (100 and -83). Based on Coles et al. (1992), the result indicates resistant towards Fenbendazole treatment.

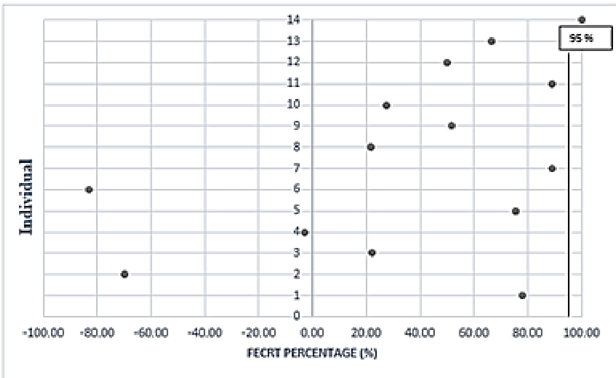

Figure 5: Faecal egg count reduction percentage (FECR%) of goats in Treatment group (95% confidence limit).

The goats in the farm were regularly dewormed and Fenbendazole is the only anthelminthic used for the deworming practices for years. This is due to bulk supply from the headquarters of the farm management. This might explain the Fenbendazole resistance in the goat population as shown by the FECRT result. The results and interpretation were informed to the farm management, and we suggest the usage of different group of anthelmintic drugs such as Levamisole, Ivermectin and Closantel. Other than that proper screening through Fecal Egg Count of parasites prior to deworming also could help reducing indiscriminate use of anthelmintics that led to the emergence of anthelmintic resistance, which is a major constraint for nematode control throughout the world (Singh et al, 2017).

4. CONCLUSION

In conclusion, even though the mean FEC decreased followed the deworming procedures using Fenbendazole, FECRT results resistance to Fenbendazole of the goat in the farm. Other than changing and alternating of different groups of anthelminthic drugs, the farms also could reduce further anthelminthic resistance by limiting early morning grazing and changing the time for grass harvesting. Utilization and inclusion of medicinal herbs with anthelminthic properties in the feeding regime of the goat also could reduce the dependency on anthelminthic drugs. This present study was focusing on only one type of anthelminthic drug and small sample size of animals. Future research should emphasize on utilization of different groups of anthelminthic drugs in periodical time to monitor and hinder the development of anthelminthic resistance.

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