THE VRI SMALL RUMINANT FIELD PROGRAMME: ASSESSMENT OF PARASITIC INFECTIONS IN LOCAL SMALLHOLDER FARMS FROM 2012 TO 2013

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ABSTRACT. A high impact project (Small Ruminant Program) was conducted by the Veterinary Research Institute (VRI), Ipoh, Perak with the collaboration of the Department Veterinary Services, Perak. The objective of this study was to asses the parasitic infections, which was helminthiasis and blood protozoan infections in local smallholder farms in Perak between 2012 and 2013. Hence, samples were collected routinely from small ruminant farms for this study. The survey was conducted in four farms in 2012, which were located in Kinta, Selama and Manjung districts and six farms in 2013 situated in Kinta and Perak Tengah districts of Perak. A total of 218 fecal and 238 blood samples were collected. Results indicate that the most common infections diagnosed were coccidiosis (64.7%) and helminthiasis infection (37.9 %) followed by Moniezia sp. (5.3%). Helminth infections were significant and required treatment if faecal egg counts (FEC) were more than 500 egg per gram (epg). Out of 238 blood samples, a total of 2.7% of the animals were having blood protozoa infection of *Theileria* sp., 6.1% were anemic with a Packed cell volume (PCV) value of less than 19% and 3.0% were dehydrated with PCV value of more than 38%. From this study, it shows that parasitic diseases can be managed by good animal husbandry in farms since high parasitic infections were observed in farms that were poorly managed based on nutrition, hygiene and basic animal husbandry practices. The main aim of this study was to help to create awareness among farmers on proper management of animals and also to provide a baseline data for health and epidemiology for small ruminants in Malaysia.

Keywords: Helminth, Coccidiosis, protozoan infections, management

INTRODUCTION

The livestock industry in Malaysia is one of important sub sector in agriculture as shown in the Agriculture National Key Economic Areas for food safety and security (http://etp.pemandu.gov.my, 2014). The main constraints hindering the productivity of small ruminants are infectious diseases, poor nutrition, poor breeding policies and poor management. Parasitic diseases such helminthiasis, coccidiosis and blood protozoa, constitute

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as the first clinical conditions to be detected in small ruminants followed by a reduction in immunity leading to bacterial and viral conditions (Soulsby, 1982). The combination of these debilitating diseases will cause severe mortality and morbidity to flocks.

The parasite that causes significant losses to the small ruminant industry is the bloodsucker nematode; *Haemonchus contortus* in the abomasum that may lead to blood loss, dehydration and anaemia (Soulby, 1982). Anaemia also may be seen in some cases of severe infestation of coccidia due to intestinal mucosa invasion and destruction by the unicellular protozoa. *Theileria* sp. is a blood protozoa present in the red blood cell of the small animal also may lead to the anemia and have been cause for losses in small ruminant productions (Jabbar, 2011). The PCV is the percentage of the red blood cells in blood. Normally it is usually above 30 percent. When PCV drops below 19 percent, symptoms of anemia usually start to appear (Kaplan *et. al.,* 2004).

Coccidiosis infection is mainly caused by the *Eimeria* species (Soulby, 1982). Heavy infections will result in severe diarrhea, usually tinged with blood and diagnosis can be done through faecal examination (Urquhart *et al,* 1996) by identifying the oocysts.

Management and nutrition also affects the helminth infections of livestock. Poor nutrition and hygiene is an important contributing factor to the high incidence of disease in small ruminants (Foreyt, 1990). Effective control of helminthiasis can be achieved by judicious use of anthelminthics and good management such as rotational grazing, separation of animals according to age group, improvement of nutrition and better housing systems.

This study was conducted to report the occurrence of helminth and protozoan infections in small ruminant farms in Perak District from 2012 to 2013. This study is one of surveillance programmes for small ruminants that was conducted as a collaborative initiative by the Veterinary Research Institute, Ipoh and the State Veterinary Services. The main aim of this program is to help create awareness amongst farmers on current debilitating diseases that cause losses in productivity and also provide a baseline data for epidemiological studies to improve the small ruminant sub sector.

MATERIAL & METHODS

A surveillance programme for small ruminants was conducted through the Small Ruminant Programme in four goat farms (Farm 1 to 4) in 2012 and 6 goat farms (Farm 5 to 10) in 2013. Fecal and blood samples were taken from approximately 10% of animals from the total farm population. Rectal fecal samples collected from animals were subjected to McMaster Technique for the quantitative assessment of helminth eggs and coccidian oocyst. Jugular blood samples were taken for blood protozoa detection using thin blood smear examination and determination of Packed Cell Volume (PCV) by microhaematocrit technique for anemia estimation. All

methods were done according to standard procedures MAFF, 1986. Simultaneous samples were sent for bacterial, viral and serological analysis. Personal interviews with the farmers were also conducted during the farm visit to obtain information on farm management and health history.

In 2012, 98 fecal and 99 blood samples were collected in 4 farms in Gopeng, Kampar, Selama and Manjung districts. The goat breed in this survey included Boer Cross, Local Katjang Cross, Anglo Nubian Cross, Jamnapari, Boer and Ferrel. A total of 3 farms (Farm no 1, 2 and 4) practiced semi intensive farming, while one farm (Farm no 2) was intensive farming.

In 2013, 120 fecal and 139 blood samples were collected in 6 farms in 2 districts (1 farm in Kinta, 5 farms in Perak Tengah). Goat breeds in 6 farms include Local Katjang Crosses, Boer, Farel, Jamnapari, Katjang and Saanen Cross. A total of 4 farms (Farm no 6, 7, 9 and 10) have practiced semi intensive farming, while 2 farms (Farm no 2) have intensive farming.

With this, there were a total of 218 fecal samples and 238 blood samples taken from 10 farms and all of them were analysed for parasitic infections.

Based on the farm profile information (Table 1), it was found that Farm 2, 5 and 8 practiced intensive farming while other farms had semi intensive farming system. Six farms (farm 1, 4, 6, 8, 9 and 10) were reported to use Ivermectin as an anthelmenthic while 4 farms (no 2, 3, 5 and 7) were not treated with any anthelmenthic. The frequencies of anthelmenthic usage are unknown as there were no records kept by farmers.

RESULTS

With reference to Table 2, the faecal examination only one farm did not show helminthiasis, whereas two farms had low infection (Farm 2 & 8). A total of five farms showed low faecal egg counts (Farms 1,4,6,7 &10 had faecal egg counts of below 500 epg). A total of seven farms (Farm 1, 3, 4, 6, 7, 9 &10 had faecal egg counts of more than 1000epg). Thus, it was observed that an average of 25.8% of the faecal samples had low faecal egg counts, followed by 37.9% of the faecal samples having high faecal egg counts necessitating treatment. An average of 5.3% of the faecal samples tested showed the presence of *Moniezia* sp. tapeworm, whereas all ten farms showed evidence of coccidiosis due to *Eimeria* sp. with 3 farms showing all samples testing positive; that is Farm 1,4 & 7.

Based on the blood samples analysed for PCV and blood protozoas, results from Table 2 shows, that only Farm 1 and Farm 9 had recorded positive for *Theileria* sp. Four farms (1, 3, 7 and 10) showed the PCV levels below 19 % in a few animals. The results also showed that only 2 farms (Farm 4 and 5) had high PCV of more than 38% indicating dehydration. Other farms did not record any blood parasites and the PCV was in the normal range (19%-38%).

Based on Figure 1, results

Table 1. Farm profile: Information on location, farm system and population, breed and parasite control programme

Year	Farm	District	System	Animal population	Breed	Deworming
2012	1	Gopeng	Semi Intensive	70	Boer Cross/ Local	Bomectin, Kelamectin,
	2	Kampar	Intensive	110	Anglo Nubian Cross, Jamnapari & Boer	-
	3	Selama	Semi Intensive	161	Boer Cross, Farel	-
	4	Manjung	Semi Intensive	85	Breeding Cross	Ivermectin.
2013	5	Kinta	Intensive	200	Boer, Local	-
	6	Perak Tengah	Semi Intensive	40	Boer, Farel, Jamnapari	Bomectin
	7	Perak Tengah	Semi Intensive	68	Local, Katjang	-
	8	Perak Tengah	Intensive	442	Jamnapari	Ivermectin
	9	Perak Tengah	Semi Intensive	250	Katjang, Boer, Farel, Jamnapari Cross, Saanen	Ivermectin & Doramectin
	10	Perak Tengah	Semi Intensive	52	Katjang, Boer	Ivermectin

indicated that farm 1, 3 and 9 had a high percentage of goats having low PCV which may result from helminthiasis and coccidiosis. The low PCV level indicated that the goats were anemic (Kaplan *et. al*., 2004). Farm 1, 4 and 7 showed a high level of coccidiosis and accompanied by the high PCV level (>38%) which can be caused by diarrhea, an important clinical manifestation of coccidiosis. Clinical signs such as dehydration can result in high PCV in animals (Peter D., 2012).

Based on Figure 2, animals in farm 1 and 9 were recorded having *Theileria* sp in blood and low values of PCV. The low PCV values indicate anaemia that may result from blood protozoal infections as well as helminthiasis (Chandrawathani *et al*., 2009). The effect of blood sucking activities of these helminths and the heamolytic activities of the heamoparasites might be the cause of anaemia in the

Table 2. The Percentage (%) of parasitic infections from faecal and blood samples and PCV from blood samples in ten goat farms.

FARM	FAECAL SAMPLES							BLOOD SAMPLES			
	(n= no. of faecal samples examined	Fecal Egg Count (e.p.g) %				*Positive Moniezia* sp. (%)	Positive Coccidiosis (Eimeria sp.) (%)	n = no. of blood samples examined	*Positive Thieleria* sp. (%)	PCV <19% (%)	PCV >38% (%)
		0 (%)	1-500 (%)	501-1000 (%)	>1000 (%)						
1	24	0	42	25	33	4	100	24	13	17	0
2	25	96	4	0	0	0	44	25	0	0	0
3	24	4	8	21	67	4	71	25	0	20	0
4	25	40	44	0	16	8	100	25	0	0	8
5	11	100	0	0	0	27	46	9	0	0	22
6	25	16	52	24	8	0	72	25	0	0	0
7	9	0	45	22	33	0	100	25	0	4	0
8	30	97	3	0	0	3	27	30	0	0	0
9	30	3	13	31	53	7	7	35	14	0	0
10	15	7	47	26	20	0	80	15	0	20	0
Average %		36.3	25.8	14.9	23	5.3	64.7		2.7	6.1	3.0

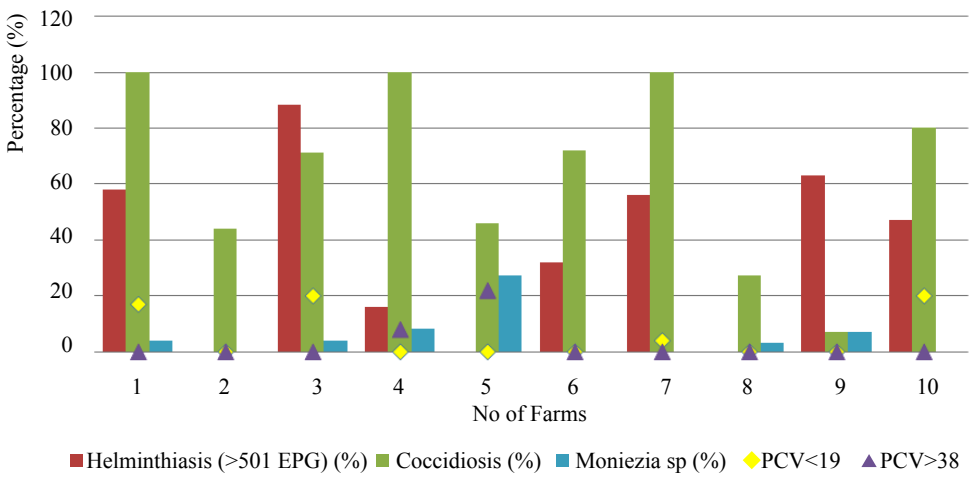

Figure 1. The comparison of percentage (%) of Helminthiasis and Coccidioasis at Perak farms with the percentage (%) of Pack Cell Volume (PCV) in 2012 and 2013.

infected animals (Jatau *et al.*, 2011). Farm 4 and 5 shows high PCV and this is proven by Ehsan *et al.*, (2013), where an increase of PCV values observed in primary infected animals corresponded to the decrease of the total blood volume as a result of blood losses during the hemorrhagic phase of diarrhea.

DISCUSSION& CONCLUSION

In this study, a total of 218 fecal samples were examined for parasites, and results indicate that the most common infections diagnosed were coccidiosis (64.7%) and helminthiasis infection (37.9 %) followed by Moniezia sp. (5.3%). Helminth infections were significant and require treatment if faecal egg counts (FEC) were more than 500 egg per gram (epg). A total of 238 blood samples were examined for blood protozoa and PCV estimation, and was found that 2.7% of animals were having blood protozoa infection of *Theileria* sp., 6.1% were anaemic with a Packed cell volume (PCV) value of less than 19% and 3.0% were dehydrated with PCV value of more than 38%. In a recent study, Chandrawathani *et al.*, (2014) reported that over an 80 year period, the VRI has diagnosed about 4 % of the small ruminants as having Theileriosis. This is seen as a consistent infection in the history of small ruminant farming in Malaysia.

Based on results, it was found that helminthiasis and coccidiosis is a common occurence in local small ruminant farms and accompanied by anaemia in the animals. However, helminthiasis and coccidiosis was detected commonly at a chronic level. This was further, perpetrated by anemia which could be caused by other factors such

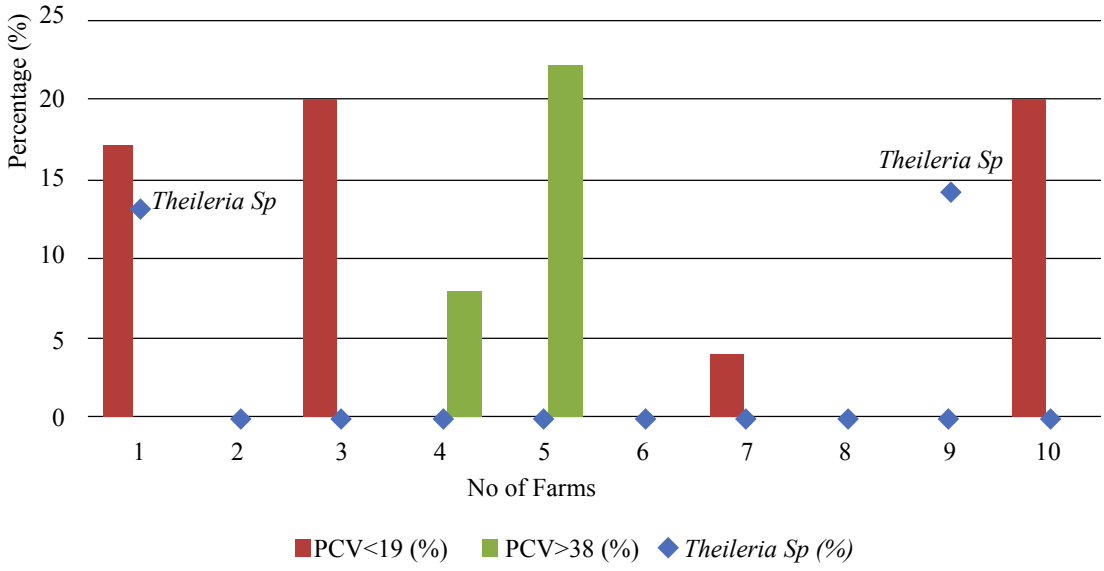

Figure 2. The comparison of percentage (%) of blood protozoa and Pack Cell Volume (PCV) at Perak farms in 2012 and 2013.

as poor nutrition and management stresses such as hygiene, housing or overcrowding and anthelmenthic status in each farm.

In this study, it was found that there was a very high prevalence of coccidial infection with higher oocyst counts and less infections of *Moniezia* sp. A study by Yvore´ *et al.*(1980) claimed that severe enteric lesions with diarrhoea and very high oocyst counts are associated with severe coccidiosis. Infected animals will develop almost similar gastrointestinal related clinical signs such as diarrhea, inappetence, weight loss, poor growth and emaciation (Jalila *et al.*, 1998). This was related to the poor management of farms with dirty floors in sheds. Accumulation of faeces in the shed is reduced if the floor is well conceived and maintained. Keeping the floor of the shed clean and regularly removing the dung from under the shed may drastically reduce coccidial infections. Good hygiene reduces the transmission of coccidia, and also the rate of infection and the prevalence of disease (Foreyt, 1990).

The condition of faecal samples collected in this study showed a mix of some diarrhoeic and normal faeces while blood protozoan infection also was noted. These infections contribute to further reducing the immunity of animals making them prone to other secondary infections. Parasitic infections are a hazard that needs to be attended to urgently as it is a condition that can be treated and infections overcome with efficient drug and management measures.

Poor nutrition and hygiene is an important contributing factor to the high incidence of disease in small ruminants. Effective control of helminthiasis can be achieved by judicious use of anthelminthic and good management such as rotational grazing, separation of animals according to age group, improvement of nutrition and better housing systems. The use of anthelmenthic, coccodiostat and tickicides in the farm will help in controlling the parasitic infection. The availability of this information will further enhance small ruminant farmers' awareness towards better management and higher productivity.

In conclusion, the result of this study elucidates important information that is needed to propel small ruminant farming to a commercial and viable scale. Information on anthelmintic use, detailed farm management, feeding, watering and general husbandry is lacking as no records were kept by smallholder farmers. The high prevalence of parasitic infections that can cause mortality and morbidity such as tapeworm, strongyle and coccidial infections are proof that basic management practices of parasite control are not practiced. In addition, anthelmintic use is not monitored by farmers and there is evidence of severe anthelmintic resistance among the small ruminant population, making it challenging for helminth control (Premaalatha *et al*., 2014). Previous information by Bohari *et al.,* (2013) showed that a study on 7 farms in Perak indicated that more than 80% of the small ruminants had strongyle and coccidial infections concurrently with bacterial infections such as Caseous lymphadenitis, melioidosis and brucellosis. Furthermore,

farmer awareness on common parasitic conditions was poor as most depended on the State Veterinary Services or commercial drug salesman for basic advice. Therefore, the small ruminant programme needs to be continuously carried out not only as a means to educate and upgrade knowledge of farmers but also for the VRI to compile data on current disease occurrence among smallholders so that effective follow up research can be done to problem solve issues on treatment, control and eradication of common diseases for farmers.

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