UNIVERSITI PUTRA MALAYSIA

COMPARATIVE BLOOD PARASITES IN BOER GOATS REARED UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEMS

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It is hereby certified that we have read the project paper entitled “Comparative blood parasites in Boer goats reared under intensive and semi-intensive systems” by Cik Nasriah binti Said and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfillment of the requirement for the course VPD 4999.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPD 4999 - Projek

PERBANDINGAN PARASIT DARAH PADA KAMBING BOER YANG DITERNAK SECARA SISTEM INTENSIF DAN SEPARA - INTENSIF

Oleh

Cik Nasriah binti Said

2015

Penyelia: Prof. Madya Dr. Rosnina Hj Yusoff

Satu kajian telah dijalankan untuk membandingkan prevalens parasit darah daripada 38 ekor kambing Boer yang diternak di dua ladang yang mengamalkan dua sistem pengurusan: intensif dan separa - intensif di Selangor. Kumpulan umur dan jantina bagi setiap kambing telah ditentukan semasa pensampelan. Sampel darah diambil dari vena jugular setiap kambing, dibuat calitan dan diperiksa di bawah mikroskop cahaya (100X) di bawah rendaman minyak. Hasil kajian menunjukkan tidak

terdapat perbezaan yang signifikan terhadap prevalens parasit darah antara sistem pengurusan (p = 0.232), jantina kambing (p = 0.363), dan kumpulan umur yang berbeza (p = 0.106). Kadar prevalens keseluruhan parasit darah di kedua-dua ladang adalah 21.1 % dengan 5.3 % dari ladang intensif dan 15.8 % dari ladang separa-intensif. Kadar prevalens didapati lebih tinggi pada kambing muda dan betina dewasa berbanding dengan kambing jantan dewasa. Oleh itu, boleh disimpulkan bahawa parasit darah boleh menjangkiti kambing Boer secara sama rata pada mana-mana kumpulan umur, jantina dan sistem pengurusan.

Kata kunci: Kambing Boer, parasit darah, kadar prevalens

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of course, VPD4999 – Project

COMPARATIVE BLOOD PARASITES IN BOER GOATS REARED UNDER INTENSIVE AND SEMI-INTENSIVE SYSTEMS

By

Cik Nasriah binti Said

2015

Supervisor: Assoc. Prof Dr. Rosnina Hj Yusoff

A study was conducted to compare the prevalence of blood parasites in 38 Boer goats raised in two farms in Selangor practicing two management systems: intensive and semi-intensive. Age group and sex of each goat were determined during blood sampling. Blood samples were obtained from the jugular vein of the goats, smeared and examined under light microscope (100X) in oil immersion. Results showed there were

no significant difference on the prevalence of blood parasites between the two management systems (p=0.232), sex of goats (p=0.363), and age groups (p=0.106). The overall prevalence rate of blood parasites in the two farms was 21.1% with 5.3% in intensive management system and 15.8% in the semi-intensive management system. The prevalence rate was found to be higher in the young and adult female goats compared with adult male goats. Therefore, it could be concluded that blood parasites can infect equally the Boer goats at any age group, sex and management system.

Keywords: Boer goats, blood parasite, prevalence rate

1.0 INTRODUCTION

Goats are considered as an important livestock in the world economy because they are used for meat, milk and hide production. They are among the earliest species domesticated (Galal, 2005). In developing countries like Indonesia and Malaysia, this species is very important for its meat and milk to small holders and part-time farmers (Abdelrahman, 2009; Kioumarsi et al, 2011). For their meat and milk (Memon, 2012) there is a significant turnaround of livestock industries in Asia. In recent years, there have been a number of livestock showing considerable population increase. This change in growth is believed to be due to increase human population, increase per capita income, and change in reproductive technology (Tisdell, 1998). In Malaysia, the Federation of Livestock Farmer's Association (FLFAM) in 2010 had reported that goat population was estimated at 545 thousand. A report by the Department of Veterinary Services (2008) on mutton production, from 2008 to 2015, has been extrapolated to increase from 8.99% to 35% if the goat population is increased to 1.5 million (Fazly, 2011). Even though mutton production increased from 666 metric tonnes in 1990 to 1,958 metric tonnes in 2008, self-sufficiency in meat was not attained in Malaysia. Then on, Malaysia has been dependent on imports to meet the shortfall in domestic production. By 2007, the import had increased to 16,303 metric tonnes from 10,707 metric tonnes in 2003 (Kaur, 2010). To meet local demand, the Malaysian government encourages farmers and small holders to raise goats.

Boer goats are considered to be one of the most desirable goat breeds for meat production. In Sibu, Sarawak, more than 200 Boer goats were reared under intensive system on a private farm in 2013. Intensive goat farming involves confinement of goats in a shed. They are exclusively stall-fed (zero grazed) and mating is controlled. On the other hand, semi-intensive farming combines intensive and extensive systems where goats are allowed to browse for a stipulated period and concentrates and mineral salts are also provided to them (NAFIS, 2000).

Boer goats evolved in South Africa from indigenous African goats (Duricic et al., 2012). They are easily recognized by their large, muscular white body and distinctive brown head (Linda, 2002). They have the ability to quickly acclimatize and adapt to a new environment, can tolerate high temperature, have low parasitic infestation (Duricic et al, 2012) and are highly resistant to diseases (Lu, 1989). Boer goats are considered less susceptible to endoparasitism (Barry and Godke, 1997).

Endoparasites include helminths and blood parasites. The following are some blood parasites that can infest goats: *Theileria lestoquardi, T. ovis, T. separata, Babesia ovis, B. motasi, T.uilenbergi, T. lewenshuni* (Ahmed *et al*., 2006; Altay *et al*., 2008; Heidarpour *et al*., 2009; Inci *et al*., 2010; Li *et al*., 2011; Nagoreet *et al*., 2004; Yin *et al*., 2007; Gebrekidan *et al*., 2014). Blood parasites caused by different tick-borne hemoprotozoa of the genera *Theileria* and *Babesia* are among the most economically important haemoparasites of domestic ruminants in sub-Saharan Africa. They caused

economic loss due to decreased production, high cost of treatment and prevention (Gebrekidan *et al*., 2014).

In Malaysia, there is a lack of publication on blood parasites in Boer goats that are managed under intensive and semi-intensive systems. The last publication about blood parasites in goats was reported by Fazley *et al.* in 2011 in Perak, Malaysia. Therefore, this study aims to compare the prevalence of blood parasites in Boer goats raised under intensive and semi-intensive systems and to compare the prevalence of blood parasites in Boer goats between age groups and sexes.

2.0 LITERATURE REVIEW

2.1 Goat

Goats were among the first species to be domesticated and there are evidences of their domestication in the Indus Valley, China and Meso America (Boyazoglu and Hatziminaoglou, 2004). Goats are distributed all over the world because of their great adaptability to various environmental conditions (Mahmud, 2010). According to FOASTAT (2011), the goat population in the world is estimated at 861 million with the largest number of goats in Asia. In Asia, there are over 539 million heads, representing 61.6% of the total population followed by Africa. China has the largest goat population with over 142 million heads, followed by Pakistan with 61.4 million goats and Nigeria with 57.3 million heads. From 2000 until 2011, the total number of goats in the world has increased by 16.52%. The number of goats in the world has increased between 1% and 4% each year since 1990 whiles the major goat exporters are Australia and New Zealand (Solaiman, 2007).

Goats of the world are raised for three main purposes: fibre (e.g., Angora, Cashmere), dairy (e.g., Saanen, Toggenburg, and Nubian) and meat (e.g., Boer, Spanish) (Dhanda et. al., 2003). They proved useful to man due to their productivity, small size, and no competition for food. Therefore, in developing countries goats make valuable contribution especially to the poor in rural areas (Mahmoud, 2010).

A study by Kaur (2010) showed that 72% of respondents had previous experience in consuming goat meat but the frequency and quantity of goat meat

consumption was quite low. However, increase in human population followed by urbanization had increased the demand for high quality animal proteins in Malaysia. Therefore, goat meat could be an alternative nutrition to the public (Kaur, 2010). Besides, there are no restriction to any particular region and is accepted by all walks of life. In addition, low capital investment and increase demand of goat meat in the market indicated that goat farming is a good marketing prospectus to the local farmers (Ariff et. al., 2010). Therefore, to fulfill this demand, the farming community in Malaysia imported Boers goats in substantial quantity from South Africa and Australia in the last decade (DVS, 2011).

According to the Department of Veterinary Services, the goat population in 2013 was 482 thousand and there was a 4.9% increase in the goat population in Malaysia since 2012. In 2013, the total number of mutton consumption was 26,990 metric tonnes but the total number of local mutton production in Malaysia was only 3,630 metric tonnes.

2.1.1 Boer goat

Increases in demand make Boer goats a good choice to be reared for meat due to their excellent body conformation, faster growth rate and good carcass quality. Boer goats are a mixture of African indigenous goats, Indian goats, Angora goats, and with some influence of European dairy goats (Lu, 2002). Therefore, they have several advantages such as good mothering ability, adaptability, hardiness, and resistance to diseases (Barry & Godke, 1997; Casey & Van Niekerk, 1998; King, 2009). Boer goats are typically white in colour with red head, blaze and pigmented skin, drooping ears,

long legs and good body conformation. The birth weight of Boer kids ranged from 3.2 to 4 kg and the average weaning weight is 24.9 kg. Male Boer goats weighed between 69 and 130 kg and the females weigh between 51 and 80 kg, with average growth rate of 250 and 186 grams respectively (Animal Genetics Training Resource, 2010).

2.2 Management systems

In Malaysia, farmers usually practiced the traditional system which are the extensive (pastoral), semi-intensive (agropastoral) and intensive (agriculture or village) (Kusiluka, and Kambarage, 1995). In an extensive management system, animals are let-out to graze on communal land. Breeding is not controlled and no supplementary feeding is given to the animals. In addition, Adebowale (2012) defined the extensive system as when the animals move freely to feed on forages or grasses. Neither supplementary feeding nor shelter is provided to them (Adebowale, 2012). For the semi-intensive system, animals are allowed to graze during restricted period of time, usually late morning or late evening. At night, animals will be confined in the sheds (Kusiluka and Kambarage, 1995). This means that the movement of the animals is regulated by the owner. Supplementary feeding is sometimes given to them. In intensive system, stall feeding (zero-grazing) is commonly practiced. Animals are confined in sheds and grasses are cut and carried to them. Fodder crops are usually grown for the goats and concentrates are also provided (Kusiluka and Kambarage, 1995).

2.3 Blood parasites

Haemoparasites blood parasites are parasites that are found in the blood of an organism. They include *Anaplasma, Babesia, Eperythrozoon, Cowdria* and *Trypanosoma* species (Urquhart et al., 1988; Adejinmi, 2004). Blood parasites cause great economic losses in animal production especially in tropical and subtropical regions. Haemoparasitic infestation can persist for a long period after the acute phase of the disease ended (Castellano, 1993). A study in Ghana showed that only *Anaplasma* was found with highest prevalence in kids less than 3 months old (Sakyi et al., 2004). *Theileria sp.* was reported to cause morbidity and mortality in small ruminants in Malaysia. A study in Perak showed that blood protozoa, *Theileria sp*. was found in 25 (14.3%) out of the 175 goats (Fazly et al., 2011). According to Chandrawathani (2009), *Theileria sp*. was found in goats and sheep but the infestation was less than 5% in infected red blood cells.

3.0 MATERIALS AND METHODS

3.1 Farms and animals

This study was conducted at two different Boer goat farms that had different management system. Farm A which is located at Pulau Meranti was chosen for intensive management system. This farm was established in 2005. The purpose of this farm is for breeding and selling. From my observation, this farm has good sanitation and a clean environment. There are three shed, each is used for breeding, weaning and placing adults. The goats are fed with pellets, soy beans and Napier. Napier is planted for cut and carry system. They are cut based on the weather condition and are usually cut during the day. The farm also practices vaccination, deworming and deticking. Only goats from weaning pen were allowed for blood sample collection. Therefore, 19 samples were taken from the goat age between 6 months and 1- year - old.

Farm B which is located in Ulu Langat was chosen for semi-intensive management system. The purpose of this farm was for meat production. Goats and sheep are reared in the same shed. The goats are fed with pellets and grasses. Then, the goats are released after 11am to browse and herd back to the pens at around 6pm. No vaccination, deworming and deticking are practiced in this farm. A total of 19 blood samples were collected from goats, age between 1 and 2- years - old.

3.2 Blood sampling

Jugular blood samples of about 3 ml were collected from each goat using a venoject needle attached to an EDTA venoject tube. The blood samples were then stored in $4^{O}C$- pending analysis.

3.3 Giemsa stain and microscopic examination

For each sample, two thin blood smears were prepared. To prepare a thin blood smear, one drop of blood was placed on the glass slide. Then, a cover slip was slid on the glass slide to make a thin blood smear. Then, the smear was air dried. While waiting for the smear to dry a working stock of 10% Giemsa stain was prepared by mixing phosphate buffer solution (PBS) with Giemsa stock (ratio 9:1). Then, the smear was fixed in methanol for 3 minutes. Lastly, the smear was stained with Giemsa stain for 30 minutes and then washed under running tap water. The smear was observed under the light microscope for any blood parasites at 1000x magnification under oil immersion.

3.4 Statistical Analysis

Statistical analyses were performed using IBM SPSS version 22. All data collected on age, sex, management systems, blood parasites status (absent or present) were tabulated and analyzed for descriptive statistics.

4.0 RESULTS

Figure 1: *Mycoplasma* sp.

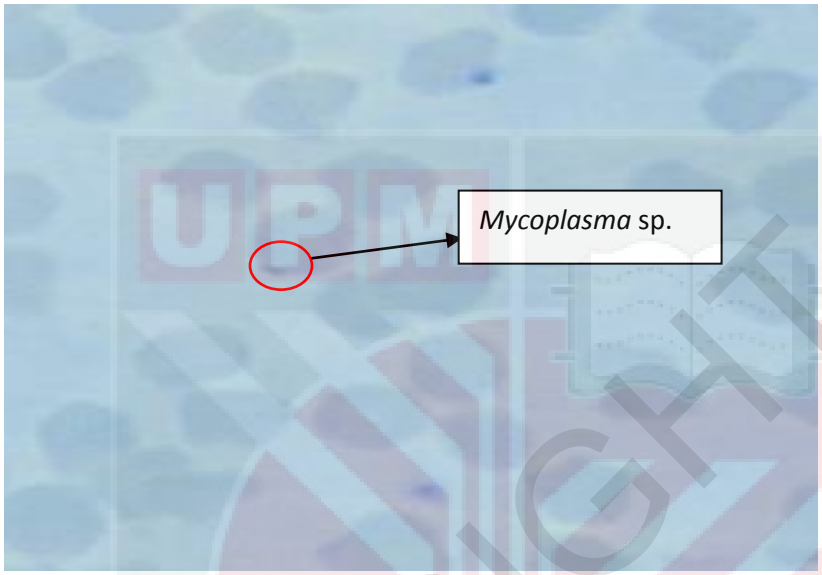


Figure 2: Number of animals infested with *Mycoplasma* sp. under different management systems.

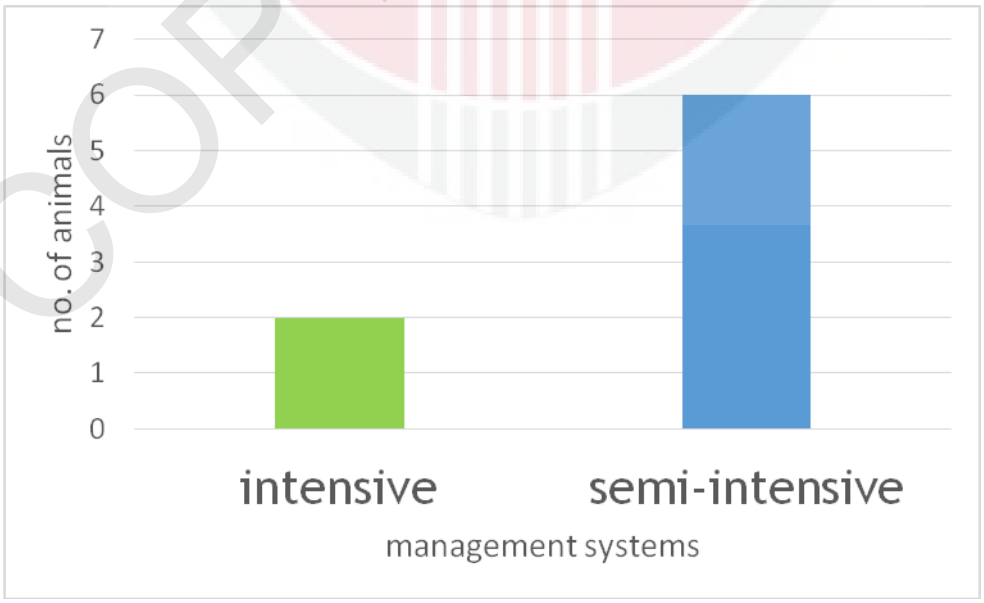
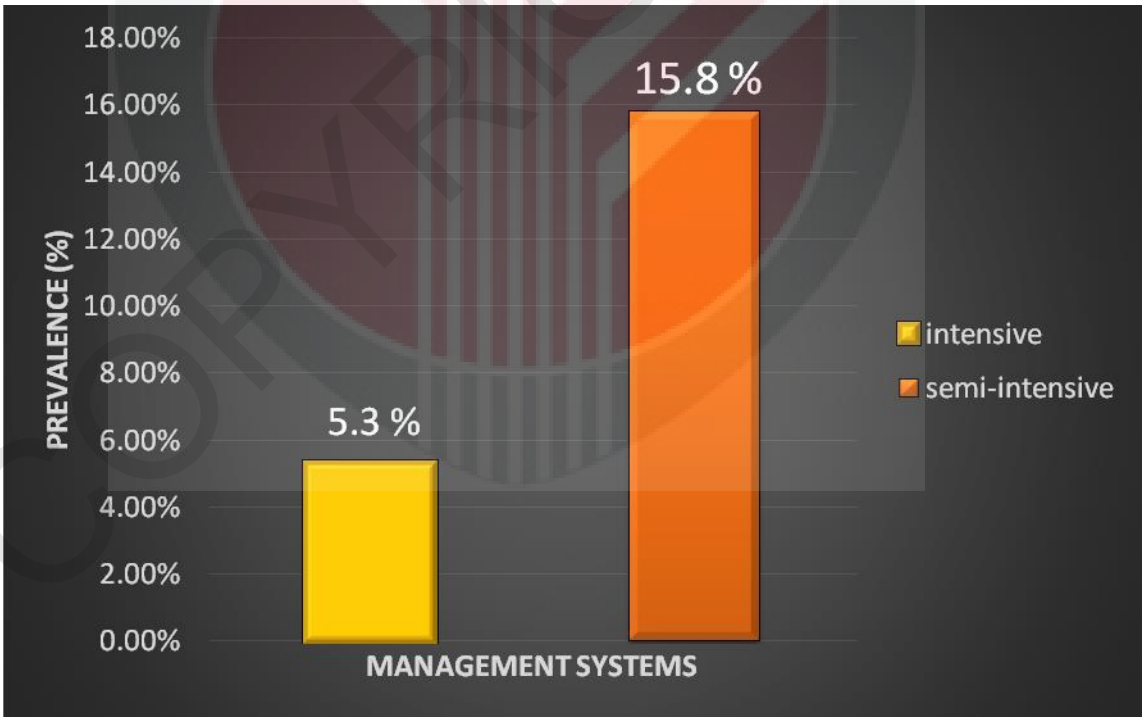


Table 1: Prevalence of blood parasites between management systems

	Value	df	Exact Sig.(2-sided)
Pearson Chi-Square	**2.533**	**1**	**0.232**

The p value is 0.232 which is higher than 0.05. Therefore, there is no significant difference on the prevalence of blood parasites between management systems.

Figure 3: Prevalence of blood parasites between management systems



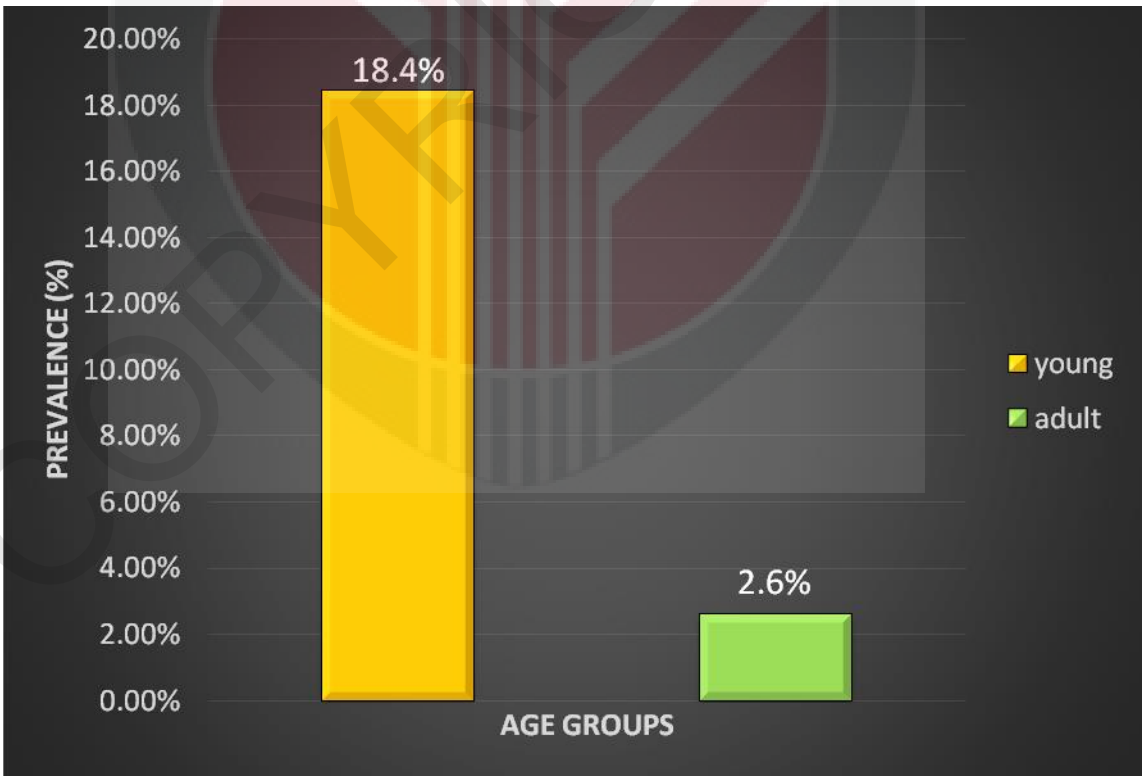
Semi-intensive system showed higher prevalence of blood parasite (15.8%) compared with intensive system (5.3%).

Table 2: Prevalence of blood parasites between age groups

	Value	df	Exact Sig.(2-sided)
Pearson Chi-Square	**3.643**	**1**	**0.106**

The p value is 0.106 which is higher than 0.05. Therefore, there is no significant difference on the prevalence of blood parasites between age groups.

Figure 4: Prevalence of blood parasites between age groups



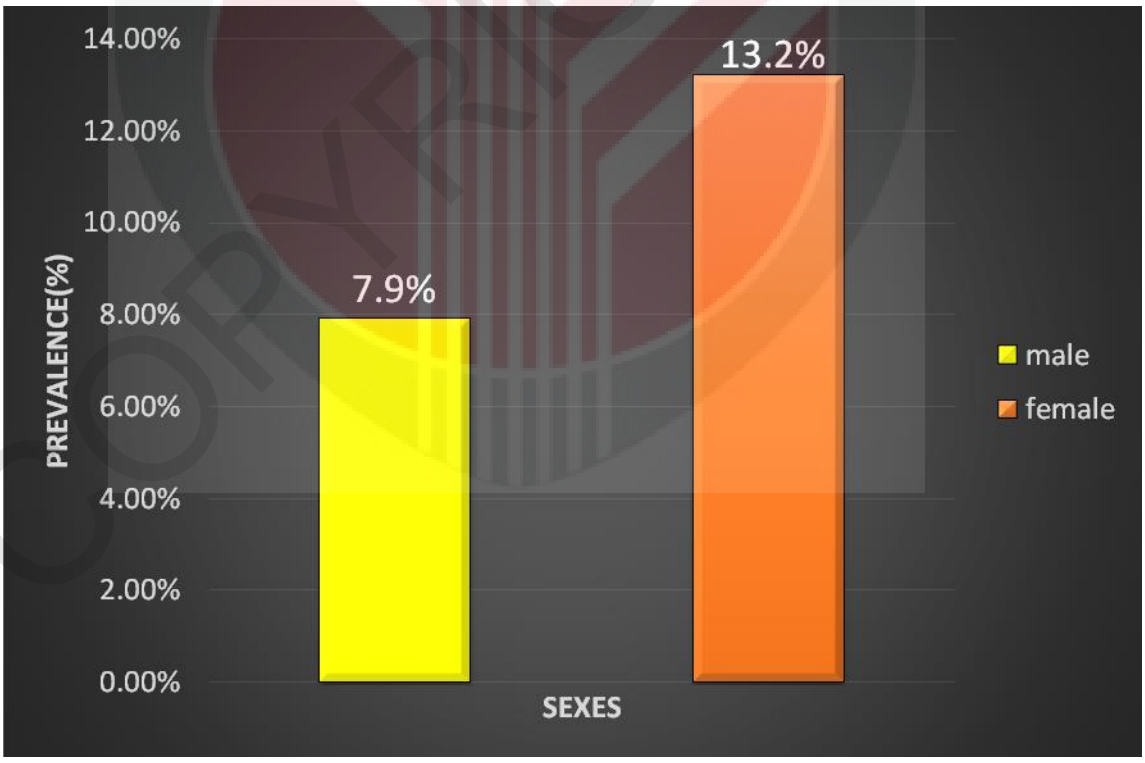
Young goats showed higher prevalence (18.4%) compared with adult goats with (2.6%).

Table 3: Prevalence of blood parasites between male and female goats

	Value	df	Exact Sig.(2-sided)
Pearson Chi-Square	**1.070**	**1**	**0.275**

The p value is 0.275 which is higher than 0.05. Therefore, there is no significant difference on the prevalence of blood parasites between sexes.

Figure 5: Prevalence of blood parasites between sexes



Female goats showed higher prevalence (13.2%) compared with male goats (7.9%).

5.0 DISCUSSION

Prevalence of blood parasites in goats should be determined in order to help farmers with their herd health programme. This is because blood parasite can cause economic loss to the farmer. The main transmission of blood parasites are through ticks such as *Rhipicephalus* sp, *Boophilus* sp, *Dermacentor* sp, *Hyalomma* sp.. All the vectors can be found on the soil. Therefore, goats are easily infected with ticks when they are allowed to browse. In addition, blood parasites can also be transmitted through contaminated equipment.

The present study revealed only *Mycoplasma* sp. can be found in goats from both systems; two goats from the intensive system and 6 goats from the semi-intensive system. Goats are usually infested with *Mycoplasma ovis* formerly known as *Eperythrozoon ovis*. *Mycoplasma* sp. may be transmitted via transfer of infected blood or use of contaminated hypodermic needles and surgical instruments. They can also be transmitted via arthropods such as lice, flies, ticks and mosquitoes.

The prevalence of blood parasites in the present study, was higher in semi-intensive system (15.8%) compared with intensive system (5.3%). This could be due to goats reared under the semi-intensive system had more exposure to vectors because they were allowed to browse. Moreover, vector (ticks) are found on the ground. Therefore, this has practical implication in the management of goats since they are more likely to be infested with blood parasites when raised semi-intensively. However, based

on the chi-square test, there is no significant difference on the blood parasites beween management systems.

In this study, the age groups of goats were divided into two group which are young goats (<1years) and adult goats (≥ 1years). The prevalence of blood parasites was higher in young goats (18.4%) compared with adult goats (2.6%). This could be due to low immunity in young goats because they have not been exposed to the disease yet. In adult goats, they usually have the immunity from previous exposure or infection especially in endemic areas. However, like in the management system, even though the prevalence was higher in young goats compared with adult goats, there is no significant difference on blood parasites between age groups.

From Figure 5, the prevalence of blood parasites was higher in female goats (13.2%) compared with male goats (7.9%) but from the chi-square test result, there is no significant difference on blood parasites between sexes. This is supported by a study in Pakistan (Naz *et al*., 2012) who claimed that gender was not found to be a risk factor in goats for blood parasites.

6.0 CONCLUSION & RECOMMENDATIONS

In conclusion, blood parasites can infect equally the Boer goats of any age group, sex and management systems. From the result, the prevalence of blood parasites is higher as this could be due to small sample size. Control and prevention of blood parasites are important because blood parasites can be detrimental to the economy. These include control of arthropod vectors, minimizing stress in the herd, avoid introducing new goats into endemic areas and monitor tick infestation on the farm. If they are present, deticking should be done.

There are some recommendations to improve future study. The sample size should be increased where more samples should be taken from goat farms in Selangor, for a clearer picture of prevalence of blood parasites in Selangor and to make the study more significant. Also, the study should be extended to other breeds of goats in Selangor for an overall status of blood parasites in Selangor. In addition, for a more meaningful study, the number of goats for sampling should be equal from the different management systems.

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