UNIVERSITI PUTRA MALAYSIA

PREVALENCE RATE OF GASTROINTESTINAL NEMATODES AND TOTAL WORM COUNT IN SHEEP

NUR SYAIRAH BINTI RAMLI

FPV 2015 56

PREVALENCE RATE OF GASTROINTESTINAL NEMATODES AND TOTAL WORM COUNT IN SHEEP

NUR SYAIRAH BINTI RAMLI

FACULTY OF VETERINARY MEDICINE

UNIVERSITI PUTRA MALAYSIA

SERDANG, SELANGOR

2015

PREVALENCE RATE OF GASTROINTESTINAL NEMATODES AND TOTAL WORM COUNT IN SHEEP

NUR SYAIRAH BINTI RAMLI

A project paper submitted to the

Faculty of Veterinary Medicine, Universiti Putra Malaysia

In partial fulfillment of the requirement for the

DEGREE OF VETERINARY MEDICINE

Universiti Putra Malaysia

Serdang, Selangor Darul Ehsan

MARCH 2015

It is hereby certified that we read this project paper entitled "Prevalence Rate Of Gastrointestinal Nematodes And Total Worm Count In Sheep", by Nur Syairah Binti Ramli 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- Final Year Project.

_____

DR. MURUGAIYAH MARIMUTHU

DVM (BOMBAY), MSC (UPM), PHD (UPM)

Faculty of Veterinary Medicine

Universiti Putra Malaysia

(Supervisor)

_____

PROF. DR MOHAMMED ARIFF OMAR

BS (LSU), MS (OSU), PHD (Texas A&M)

Faculty of Veterinary Medicine

Universiti Putra Malaysia

(Co-supervisor)

DEDICATION

I would like to dedicate this project to

My source of inspiration and motivation

Ramli bin Abdul Rahman

Rosimah binti Kaharudin

My supporters and guidance

Prof Dr. Rehana Abdullah Sani

Mohamad Zamri bin Ahamd

Abdul Rashid Abdul Rahman

Maizatul Akmal Mokhtar

Norisal Nasai

My sweet and bitter

Mohammad Noorul Syazwan bin Yaacob

My friends

Veterinarian

ACKNOWLEDGEMENT

First of all, I am grateful to The Almighty God for establishing me to complete my thesis. There are a number of people without whom this thesis might not have been written, and to whom I am greatly indebted.

Beautiful grace upon my awesome family for all their incomparable love and support. To my parents, who have been my source of encouragement and inspiration throughout my life and actively supported me to complete my project and thesis.

My supervisor Dr Murugaiyah Marimuthu and co-supervisor Prof Dr Ariff who continue to guide my career path with ingenuity and finesse. It is very comforting to know that I am in such good hands. I tremendously appreciate their contribution in polishing my work until it shines and all the support both of you gave me.

Not to forget, I wish to record my appreciation to staff of Parasitology Laboratory Fakulti Perubatan Veterinar, Maizatul and Rashid as well as owner of Ladang Tok 4 Agus Salak Tinggi, and Zamri for his cooperation during the study.

Lastly, very special thanks to my love one, Mohd Noorul Syazwan Yaacob for his practical and emotional support as well as his encouragement along the way. Alhamdulillah.

CONTENTS **PAGE**

LIST OF TABLES

TABLES **PAGE**

LIST OF FIGURES

FIGURES **PAGE**

ABSTRAK

Abstrak kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar dalam memenuhi sebahagian keperluan bagi kursus VPD 4999- Projek Tahun Akhir

PREVALENS GASTROUSUS NEMATOD DAN JUMLAH BILANGAN CACING DALAM BIRI-BIRI

Oleh

Nur Syairah Binti Ramli

2015

Penyelia: Dr Murugaiyah Marimuthu

Prevalens parasit nematod gastrousus telah dikajikan dalam 50 ekor biri-biri yang diternak di sebuah ladang pekebun kecil di Salak Tinggi, Selangor. Biri-biri terdiri daripada 27 kacukan Damara dan 23 kacukan Barbados Blackbelly yang dibahagikan kepada dua kumpulan umur: muda dan dewasa. Sampel najis telah diperiksa untuk kiraan telur nematod strongyle sebagai jumlah telur se gram najis (EPG) menggunakan teknik McMaster yang telah dimodifikasi. Tahap infestasi telah dikategorikan kepada ringan, sederhana dan berat berasaskan EPG (SI). Lima ekor biri-biri disembelih secara rawak untuk mengenal pasti nematod gastrousus dewasa dengan kaedah jumlah bilangan cacing (TWC). Skor FAMACHA (FS) telah digunakan untuk menentukan beban cacing

berdasarkan kepada anemia di kalangan haiwan ini. Kajian ini mendedahkan kadar prevalens EPG adalah 88%, di mana 84.1% daripada biri-biri tersebut adalah jangkitan ringan. Bilangan kacukan Barbados Blackbelly menunjukkan perbezaan yang signifikan (p = 0.002) untuk dijangkiti bagi EPG berbanding kacukan Damara. Terdapat perbezaan yang signifikan (p = 0.004) bagi EPG di kalangan kumpulan umur bagi kacukan Barbados Blackbelly tetapi tidak dalam kacukan Damara (p=0.941). Korelasi antara SI dan FS adalah signifikan (r = 0.289; p = 0.042). Berdasarkan TWC, *Haemonchus* sp adalah nematod yang paling dominan diikuti dengan *Trichostrongylus spp*. dan *Oesophagostomum spp*.. Korelasi antara EPG dan TWC bagi *Haemonchus* adalah positif (r=0.854; p=0.066) tetapi kolerasi tersebut adalah tidak signifikan. Berdasarkan analisis regresi, 73% daripada kebolehubahan dalam TWC bagi *Haemonchus* dapat dijelaskan oleh EPG. Oleh itu, kesimpulannya terdapat hubung kait yang baik antara skor FAMACHA dengan tahap infestasi nematod dan skor FAMACHA boleh digunakan untuk menilai beban nematod strongyle dalam biri-biri.

Kata Kunci: *Prevalens, nematod gastrousus, FAMACHA, EPG*

ABSTRACT

An abstract of the project paper presented o the Faculty of Veterinary Medicine in partial fulfillment of requirement of the course VPD 4999- Final Year Project

PREVALENCE RATE OF GASTROINTESTINAL NEMATODES AND TOTAL WORM COUNT IN SHEEP

By

Nur Syairah Binti Ramli

2015

Supervisor: Dr Murugaiyah Marimuthu

The prevalence of gastrointestinal (GI) nematode parasites was determined in 50 sheep raised in a smallholder farm in Salak Tinggi, Selangor. The sheep comprised of 27 Damara crosses and 23 Barbados Blackbelly crosses grouped into two age groups: young and adult. Faecal samples were examined for strongyle nematode egg count as egg per gram (EPG) using modified McMaster technique. Severity of infection was categorized into mild, moderate and heavy based on EPG. Five sheep were randomly slaughtered for adult GI nematodes identification by total worm count (TWC) method. FAMACHA score was used for investigation of worm load based on anaemic condition. The study revealed the prevalence rate of EPG was 88%, of which 84.1% of the sheep had mild infection. Barbados Blackbelly crosses were significantly different (p=0.002)

in EPG prevalence rate compared to Damara crosses. There was significant difference (p=0.004) in EPG between age groups for Barbados Blackbelly crosses but not for Damara crosses (p=0.941). Correlation between severity of infection and FAMACHA score was significant (r=0.289; p=0.042). From TWC, *Haemonchus* was the most predominant nematode followed by *Trichostrongylus* and *Oesophagostomum*. EPG and TWC for *Haemonchus* was positively correlated but not significant (r=0.85, p=0.066). From regression analysis, 73% of the variability in TWC for *Haemonchus* could be explained by EPG. Thus it can be concluded that FAMACHA score correlates well with severity of infection of nematode and can be used to assess the strongyle nematode burden in sheep.

Keywords: *Prevalence, gastrointestinal nematode, FAMACHA, EPG*

1.0 INTRODUCTION

Malaysia has a hot and humid climate that favors for parasite population. Climatic, geographical and farm management variation endorse marked differences in the helminth population (Domke *et al*., 2013). Besides, outbreaks are most severe in warm and humid climates (Gadahi *et al*., 2009). Gastrointestinal nematode (GIN) prevalence is influenced by farm management and climatic conditions such as quantity and quality of pasture, temperature, humidity and grazing behavior of the host (Pal and Qayyum, 1993).

GIN is actually a potential constraint on small ruminant productivity in terms of economic losses by deaths, decline in meat and milk production and diminished fertility (Vanessa *et al*., 2014). Alternative steps are essential to control measures of local epidemiology and unnecessary drug treatments that cause detrimental effect like increased development of anthelmintic resistance that leaves residues in the meat and milk, as well as in the environment.

Among the parasitic diseases, endoparasites are of greatest importance in sheep and goats (Gadahi *et al*., 2009). In Malaysia, *Haemonchus contortus* and *Trichostrongylus spp*. were reported to be the most prevalent and highly pathogenic endoparasite in livestock, particularly in small ruminants (Tan *et al*., 2014). According to Rahman *et al*., (1992), *Haemonchus spp*., *Ostertagia spp*., and *Trichostrongylus spp.* are the dominant species of nematodes commonly found in tropical goats. The pathogenicity of *H. contortus* is undeniable in livestock as its biotic potential and blood

sucking ability. The most prevalent GIN in Malaysia is similar to Brazil, which is *Haemonchus* sp (80.1%), followed by *Trichostrongylus* sp (13.2%) and *Oesophagostomum* sp (6.7%) (Vanessa *et al*., 2014). In Malaysia, ova detection is normally performed by a floatation principle and observation under a light microscope (Tan *et al*., 2014).

1.1 Justification

Current status of GIN prevalence in sheep in intensive smallholder farms is not widely studied. Furthermore, sub-clinical and clinical infections can lead to increase mortality and reduced fertility leading to a decline in meat and milk production.

1.2 Study Objective

The aim of the present study was to determine the prevalence of gastrointestinal nematodes (GIN) in non-grazing Damara and Barbados Blackbelly sheep at a Salak Tinggi smallholder farm.

2.0 LITERATURE REVIEW

2.1 Nematode infection in small ruminants

Infection with gastrointestinal nematodes (GIN) can have a detrimental effect on animal health under extensive and intensive livestock rearing. In Malaysia, haemonchosis is one of the major disease problems affecting sheep production (Sani *et al*., 1995). Dorny *et al*. (1995) reported *Haemonchus contortus* and *Trichostrongylus*

8.0 REFERENCES

Abott, K.A., Taylor, M., Stubbings, L.A. (2009). Sustainable worm control strategies for sheep, 3rd ed. *SCOPS Publishing*.

Amarante, A.F.T. (2000). Relationship between faecal egg counts and total worm counts infected with gastrointestinal nematode. *J. Vet. Parasitol*, 9:1: 45-50.

Burke, J.M., Kaplan, R.M., Miller, J.E., Terrill, T.H., Getz, W.R., Mobini, S., Valencia, E., Williams, M.J., Williamson, L.H., Vatta, A.F. (2007). Accuracy of the FAMACHA system for on-farm use by sheep and goat producers in the southeastern United States. *Vet. Parasitol.* 147: 89–95.

Burke, J.M., Miller, J.E., Terrill, T.H. (2009). Impact of rotational grazing on management of gastrointestinal nematodes in weaned lambs. *Vet . Parasitol.* 163: 67-72.

Calvetea, C., Calaviaa, R., Ferrerb, L.M., Ramosb, J.J., Lacastab, D. (2012). Management and environmental factors related to benzimidazole resistance in sheep nematodes in Northeast Spain. *Vet . Parasitol.* 184: 193–203.

Chandrawathani, P. (2004). Problems in the control of nematode parasites of small ruminants in malaysia: resistance to anthelmintics and the biological control alternative. *Doctoral thesis. Swedish University of Agricultural Science.*

Domke, A.V.M., Chartierb, C., Gjerdec, B., Leined, N., Vatne, S., Stuen, S. (2013). Prevalence of gastrointestinal helminths, lungworms and liver fluke in sheep and goats in Norway. *Vet. Parasitol.* 194: 40– 48.

Gaba, S., Chadoeuf , J., Monestiez, P., Sauve, C., Cortet, J., Cabaret, J. (2006). Estimation of abomasum strongyle nematode infections in sheep at necropsy: Tentative proposals for a simplified technique. *Vet. Parasitol*. 140: 105–113.

Gadahi, J. A., Arshed , M.J., Ali , Q., Javaid , S. B., Shah, S.I. (2009). Prevalence of gastrointestinal parasites of sheep and goat in and around Rawalpindi and Islamabad. *Veterinary World*,2(2): 51-53.

Getachew, T., Dorchies P., Jacquiet P. (2007). Trends and challenges in the effective and sustainable control of *Haemonchus contortus* infection in sheep. *Vet. Parasitol.* 14: 3-14.

Joshua, P.A., Sweenya, Robertsona, D., Ryana, U.M., Caroline J., Woodgate, R.G. (2011). Comparison of molecular and McMaster microscopy techniques to confirm the presence of naturally acquired strongylid nematode infections in sheep. *Molecular & Biochemical Parasitol.* 180: 62– 67.

Kaplan, R.M., Bur, J.M., Terrill, T.H., Miller, J.E., Getz, W.R., Mobini, S., Valencia, E., Williams, M.J., Williamson, L.H., Larsen, M., Vatta, A.F. (2004). Validation of the FAMACHA© eye color chart for detecting clinical anaemia in sheep and goats on farms in the southern United States. *Vet. Parasitol.* 123: 105–120.

Loria, A.D, Veneziano, V., Piantedosi, D., Laura, R., Mezzino, L., Giuseppe C., Ciaramella, P. (2009). Evaluation of the FAMACHA system for detecting the severity of anaemia in sheep from southern Italy. *Vet. Parasitol.* 161: 53–59.

Love, S.C.J and Hutchinson, G.W. (2003). Pathology and diagnosis of internal parasites in ruminants. In gross pathology of ruminants, Proceedings 350, *Post Graduate Foundation in Veterinary Science, University of Sydney, Sydney*; Chapter 16:309-338.

McKenna, P.B. (2008). Comparison of two worm counting procedures for the enumeration of abomasal and small intestinal nematode parasites of sheep. *Vet. Parasitol.* 157: 254–259.

Rahmann, G., Seip, H. (2006). Alternative strategies to prevent and control endoparasite diseases in organic sheep and goat farming. *Ressortforschung für den Ökologischen Landba.*

Rinaldia, L., Colesb, G.C., Maurellia, M.P., Musellac, V., Cringolia, G. (2011). Calibration and diagnostic accuracy of simple flotation, McMaster and FLOTAC for parasite egg counts in sheep. *Vet. Parasitol.* 177: 345–352.

Rinaldi, L., Veneziano, V., Morgoglione, M.E., Pennacchio, S., Santaniello, M., Schioppi, M., Musella, V., Fedele, V., Cringoli, G. (2009). Is gastrointestinal strongyle faecal egg count influenced by hour of sample collection and worm burden in goats? *Vet. Parasitol.* 163: 81–86.

Roberts, J.L., Swan, R.A. (1981). Quantitative studies of ovine haemonchosis. Relationship between faecal egg counts and total worm counts. *Vet. Parasitol.* 8: 165-171.

Peter, J.W., Stig M.T (2004). Nematode control in 'green' ruminant production systems. *TRENDS in Parasitol.* Vol.20: 10.

Vanessa, D.V. , Feitosa, T.F, Vilela, V.L.R, Azevedo, S.S, Net, J.L.D.A, Dayana F.D.M, Ana, R.C.R, Athayde, A.C.R (2014). Prevalence and risk factors associated with goat gastrointestinal helminthiasis in the Sertão region of Paraíba State, Brazil. *Trop Anim Health Prod*. 46: 355–361.

Vatta, A.F., Letty, B.A., Linde, M.J., Wijk, E.F., Hansen, J.W., Krecek , R.C. (2001). Testing for clinical anaemia caused by *Haemonchus spp*. in goats farmed under resource-poor conditions in South Africa using an eye colour chart developed for sheep. *Vet. Parasitol.* 99: 1–14.

Wahab A.R. and Adanan C.R. (1992). Observations on the worm egg counts and their nematode species in goats from the North-East district of Penang Island, Peninsular Malaysia. *Pertanika* 15(3): 221-224.

Zeryehun, T. (2012). Helminthosis of sheep and goats in and around Haramaya, Southeastern Ethiopia. *J. Veterinary Medicine and Animal Health*. 4(3): 48-55.