UNIVERSITI PUTRA MALAYSIA

ANTHELMINTIC RESISTANCE, HUSBANDRY PRACTICES AND PLANT REMEDIES FOR CONTROL OF GASTROINTESTINAL STRONGYLES IN GOAT FARMS IN KELANTAN, MALAYSIA

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By

BASRIPUZI NURUL HAYYAN BINTI HASSAN BASRI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Master of Veterinary Science

April 2013

DEDICATION

I dedicate this to my beloved family

My father, Hassan Basri Mohd Kassim

My mother, Puziah Mohd Nawi

My sister, Basripuzi Nuruladila

and my brothers,

Abdul Mu'in

Abdul Mu'iz

Abdul Mun'im

Abdul Mubin

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Veterinary Science

ANTHELMINTIC RESISTANCE, HUSBANDRY PRACTICES AND PLANT REMEDIES FOR CONTROL OF GASTROINTESTINAL STRONGYLES IN GOAT FARMS IN KELANTAN, MALAYSIA

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Chairman : Prof. Rehana Abdullah Sani, PhD

Faculty : Veterinary Medicine

Gastrointestinal parasitism is an important disease in small ruminants that relies largely on chemotherapeutic control approach. Nevertheless development of anthelmintic resistance urges the need to investigate non-chemical control approaches. A questionnaire survey on husbandry practices was conducted in eight farms in Pasir Mas and Kota Bharu, Kelantan where 202 goats were screened for gastrointestinal strongyles. Based on presence of the parasites, a total of 161 goats were selected for this study. The significant ($p < 0.05$) effects of husbandry practices on faecal egg count (FEC) was found with the time of cutting grasses, type of grasses fed, use of local plant-based dewormer, use of anthelmintics and use of goat manure as fertiliser. However when the other practices remained constant, only the use of anthelmintics and local plant-based

dewormer were found to have significant ($p < 0.01$) effects on worm burden as analysed by independent *t*-test and analysis of variance.

This study was followed by Faecal Egg Count Reduction Test (FECRT) using albendazole, ivermectin, levamisole and closantel. The goats were divided into control and treatment groups of at least five animals per group. The arithmetic mean of post-treatment FEC of the control and treated groups were analysed and varying levels of resistance were detected to albendazole, ivermectin, levamisole and closantel in six, five, two and two goat farms respectively. Resistance was suspected against albendazole, ivermectin and levamisole in one farm. Strongyle populations in two farms were still susceptible to levamisole while those in one farm was susceptible to albendazole. Levamisole was found to be the most effective anthelmintic in this study.

The questionnaire revealed that some goat farmers in Kelantan used local plants as dewormer to treat their herds. This practice evoked interest as a potential non-chemical control approach. In the present study, enhanced virgin coconut oil (EVCO) and senduduk (*Melastoma malabathricum*) were evaluated for their anthelmintic properties. 10% EVCO dissolved in 90% virgin coconut oil and 10% EVCO dissolved in 90% palm oil were given orally to two groups of goats. The efficacy

test indicated that EVCO was insufficiently active as an anthelmintic. *In vitro* test compared the larvicidal effect of 1.25, 2.5, 5 and 10 mg ml^{-1} of senduduk solution while *in vivo* efficacy test was conducted by comparing FEC of the control, levamisole and senduduk treated groups. Senduduk was found to be ineffective as a larvicide as well as an anthelmintic.

The questionnaire also revealed that some farmers recycled goat manure as fertiliser which may become the source of infection. Hence presence of free-living stages particularly the infective larvae in manure needs to be determined. Goat faeces containing strongyle eggs were deposited into five heaps representing five replicates for daily sampling and subjected to FEC, larvae identification and enumeration over 23 days of study. Infective larvae counts consisted of *Haemonchus contortus, Trichostrongylus* sp. and *Oesophagostomum* sp. reached a peak on Day 8 and were negligible by Day 14 when the manure was safe to be used as fertiliser for grasses meant for animal feed.

As a conclusion, resistance of caprine gastrointestinal strongyles to different anthelmintic classes in Kelantan has become critical. Caution must be taken as resistance may develop to levamisole, the only current effective anthelmintic. Thus combination of the effective

anthelmintic and sustainable husbandry practices may be implemented to control gastrointestinal strongyles in small ruminants. Additionally, local plants claimed by farmers to have deworming effects should be investigated as one of the non-chemical control options.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains Veterinar

KETAHANAN ANTELMINTIK, AMALAN PENTERNAKAN DAN UBATAN TUMBUHAN UNTUK KAWALAN STRONGAIL GASTROUSUS DI LADANG-LADANG KAMBING DI KELANTAN, MALAYSIA

Oleh

BASRIPUZI NURUL HAYYAN BINTI HASSAN BASRI

April 2013

Pengerusi : Prof. Rehana Abdullah Sani, PhD

Fakulti : Perubatan Veterinar

Jangkitan parasit gastrousus adalah suatu penyakit penting dalam ruminan kecil yang banyak bergantung pada pendekatan kawalan kemoterapeutik. Terdapatnya peningkatan ketahanan antelmintik sangat mendesak keperluan untuk menyelidik pendekatan kawalan bukan-kimia. Suatu tinjuan soal selidik ke atas amalan penternakan telah dijalankan di lapan buah ladang di Pasir Mas dan Kota Bharu, Kelantan di mana 202 ekor kambing telah disaring untuk strongail gastrousus. Berdasarkan kehadiran parasit, sejumlah 161 ekor kambing telah dipilih untuk kajian ini. Kesan amalan penternakan yang bermakna ($p < 0.05$) pada kiraan telur najis (FEC) telah ditemui pada masa pemotongan rumput, jenis rumput yang diberi makan, penggunaan penyahcacing berasaskan tumbuhan tempatan, penggunaan antelmintik dan penggunaan najis kambing sebagai

baja. Namun apabila amalan-amalan lain tetap kekal, hanya penggunaan antelmintik dan penyahcacing berasaskan tumbuhan tempatan yang ditemui mempunyai kesan bermakna ($p < 0.01$) pada beban cacing seperti yang dianalisa oleh ujian-*t* kebebasan dan analisis varians.

Kajian ini diikuti oleh Ujian Pengurangan Kiraan Telur Najis (FECRT) menggunakan albendazole, ivermectin, levamisole dan closantel. Kambing-kambing tersebut telah dibahagikan kepada kumpulan kawalan dan rawatan dengan sekurang-kurangnya lima ekor haiwan dalam satu kumpulan. Purata aritmetik FEC pascarawatan kumpulan kawalan dan kumpulan-kumpulan rawatan telah dianalisa dan pelbagai tahap ketahanan telah dikesan kepada albendazole, ivermectin, levamisole dan closantel dalam enam, lima, dua dan dua ladang kambing masing-masing. Ketahanan telah disyaki terhadap albendazole, ivermectin dan levamisole dalam satu ladang. Populasi strongail dalam dua ladang masih dimudarat oleh levamisole manakala yang dalam satu ladang dimudarat oleh albendazole. Levamisole telah dikenalpasti sebagai antelmintik yang paling berkesan dalam kajian ini.

Soal selidik yang dijalankan telah mendedahkan bahawa beberapa penternak kambing di Kelantan menggunakan tumbuhan tempatan

sebagai penyahcacing untuk merawat ternakan mereka. Amalan ini meningkatkan kecenderungan untuk dikaji sebagai suatu pendekatan kawalan bukan-kimia yang berpotensi. Dalam kajian semasa, minyak kelapa dara yang dipertingkatkan (EVCO) dan senduduk (*Melastoma malabathricum*) telah dinilai kesan antelmintik. 10% EVCO dilarutkan di dalam 90% minyak kelapa dara dan 10% EVCO dilarutkan di dalam 90% minyak sawit telah diberi secara oral kepada dua kumpulan kambing. Ujian keberkesanan menunjukkan bahawa EVCO tidak cukup aktif sebagai antelmintik. Ujian *in vitro* membandingkan kesan larvisidal oleh 1.25, 2.5, 5 dan 10 mg ml^{-1} sebatian senduduk manakala ujian keberkesanan *in vivo* telah dijalankan dengan membandingkan FEC pada kumpulan kawalan, levamisole dan rawatan senduduk. Senduduk telah dikenalpasti tidak berkesan sebagai agen larvisida dan juga sebagai antelmintik.

Soal selidik tersebut juga telah mendedahkan bahawa beberapa penternak menggunakan semula najis kambing sebagai baja yang mungkin menjadi punca jangkitan. Oleh itu kehadiran peringkat hidup-bebas terutamanya larva infektif dalam najis perlu ditentukan. Najis kambing yang mengandungi telur-telur strongyle telah ditimbunkan dalam lima longgokan yang mewakili lima replika untuk persampelan harian dan tertakluk kepada FEC, pengenalan larva dan perhitungan sepanjang 23 hari kajian. Kiraan larva infektif

terdiri daripada *Haemonchus contortus, Trichostrongylus* sp. dan *Oesophagostomum* sp. mencapai suatu kemuncak pada hari ke-8 dan sedikit sahaja pada hari ke-14 apabila najis didapati selamat digunakan sebagai baja untuk rumput sebagai makanan haiwan.

Kesimpulannya, ketahanan strongail gastrousus kaprin terhadap berbagai kelas antelmintik di Kelantan telah menjadi kritikal. Langkah berjaga-jaga harus diambil kerana ketahanan mungkin berlaku terhadap levamisole, satu-satunya antelmintik yang kini masih berkesan. Oleh itu, kombinasi antelmintik yang berkesan dan amalan penternakan berlanjutan mungkin boleh dilaksanakan untuk mengawal strongail gastrousus dalam ruminan kecil. Sebagai tambahan, tumbuhan tempatan yang dianggap oleh penternak sebagai mempunyai kesan penyahcacing perlu diselidik sebagai salah satu pilihan kawalan bukan-kimia.

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I certify that a Thesis Examination Committee has met on 16 April 2013 to conduct the final examination of Basripuzi Nurul Hayyan binti Hassan Basri on her thesis entitled "Husbandry Practices, Anthelmintic Resistance and Plant Remedies for Control of Gastrointestinal Strongyles in Goat Farms in Kelantan, Malaysia" in accordance with the Universities and Universities Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1988. The Committee recommends that the student be rewarded the Master of Veterinary Science.

Members of the Thesis Examination Committee were as follows:

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Date : 26 June 2013

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Veterinary Science. The members of the Supervisory Committee were as follows :

Rehana Abdullah Sani, PhD
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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.

BASRIPUZI NURUL HAYYAN HASSAN BASRI

Date : 16 April 2013

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