
**UNIVERSITI PUTRA MALAYSIA**

# *THE EFFECTS OF METHANOL EXTRACTED ARECA CATECHU (BETEL NUT) AND LEVAMISOLE ON IN-VITRO SURVIVAL RATE OF STRONGYLES IN GOATS*

**NURUL FARLIANA BINTI MAT DESA**

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# THE EFFECTS OF METHANOL EXTRACTED *ARECA CATECHU* (BETEL NUT) AND LEVAMISOLE ON *IN-VITRO* SURVIVAL RATE OF STRONGYLES IN GOATS

**NURUL FARLIANA BINTI MAT DESA**

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It is hereby certified that we have read this project paper entitled "The Effects of Methanol Extracted *Areca catechu* and Levamisole on in *In-vitro* Survival Rate of Strongyles in Goats", by Nurul Farliana Binti Mat Desa 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 – Project.

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**DR. ROZAIHAN BINTI MANSOR**

**DVM (UPM), PhD (GLASGOW)**

Lecturer,

Faculty of Veterinary Medicine, University Putra Malaysia

(Supervisor)

_____

**PROF. MADYA DR. SHAIKH MOHAMED AMIN BABJE**

**BV (VS), MSc (NORTH WALES), PhD (QUEENSLAND)**

Lecturer,

Faculty of Veterinary Medicine, University Putra Malaysia

(Co-Supervisor)

**DEDICATIONS**

I dedicate this thesis with love and appreciation to:

**My parents and siblings**

NORFAH HAMID and MAT DESA SAIDON

NURUL FATIN AZRINA and NURUL SYAMIMIE

**My furry friends**

ABBY, BABU, NAOMEI, AFIL'S FAMILY

**My friends and FYP mates**

IDA AMALINA MAHADI

NURUL HAIRUNNISA

AISYAH PAUZI

NUR HUSNA ATIKA AZHAR

**My Coursemates**

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## ABSTRAK

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

KESAN EKSTRAK METANOL*ARECA CATECHU* (PINANG) DAN LEVAMISOL KE ATAS KADAR KEMANDIRIANSTRONGIL SECARA IN-VITRO PADA KAMBING

Oleh:

Nurul Farliana Binti Mat Desa

2016

Supervisor: Dr. Rozaihan Mansor

Co-Supervisor: Prof. Madya Dr. Shaikh Mohamed Amin Babje

Penggunaan meluas antelmintik kimia dalam pengurusan gastroenteritis parasit (PGE) telah mewujudkan rintangan, sekali gus mengurangkan keberkesanannya. Kajian ini telah dijalankan untuk membandingkan keberkesanan ekstrak *Areca catechu* (pinang) dan levamisole terhadap kadar kemandirian larva strongil peringkat ketiga (L3) pada kambing dan untuk menentukan konsentrasi efektif ekstrak pinang (EP) untuk aktiviti larvacidal terhadap strongil L3 dalam keadaan *in-vitro*. Bahan tinja segar kambing yang dijangkiti secara semula jadi telah

dikumpulkan dan larva peringkat kedua dituai selepas 7 hari untuk menganggarkan bilangannya. Ekstrak metanol pinang pada 300, 600 dan 1200 µg/ml, levamisol pada 10 mg/ml dan PBS ditambah 0.1% DMSO telah disediakan untuk menentukan kesan aktiviti larvisid mereka. EP pada 1200 µg/ml menunjukkan 61.70% daripada L3 mati dalam tempoh 24 jam selepas ekstrak didedahkan, pada masa yang sama levamisol pada 10 mg/ml menunjukkan kadar kematian 100% daripada L3 dalam tempoh 2 jam selepas ekstrak didedahkan ($p < 0.05$). Peratusan kematian tertinggi strongil L3 (43.40%) dimiliki oleh *Oesophagostomum* sp, diikuti oleh 40.90% daripada *Haemonchus* sp dan 15.70% daripada *Trichostrongylus* sp. Walaupun kesan EP tidak efektif seperti levamisole, ia mempunyai pengaruh besar dalam aktiviti antelmintik terhadap larva strongil pada kambing dan boleh digunakan sebagai alternatif antelmintik pada masa hadapan.

Kata kunci: Pinang (*Areca catechu*), Strongil, Larvasid, Metanol.

## ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfillment of the course VPD 4999-Project

THE EFFECTS OF METHANOL EXTRACTED *ARECA CATECHU* (BETEL NUT) AND LEVAMISOLE ON *IN-VITRO* SURVIVAL RATE OF STRONGYLES IN GOAT

By:

Nurul Farliana Binti Mat Desa

2016

Supervisor: Dr. Rozaihan Mansor

Co-Supervisor: Prof. Madya Dr. Shaikh Mohamed Amin Babje

The extensive use of chemical anthelmintics in parasitic gastroenteritis (PGE) management has created resistance, thus reducing their effectiveness. The present study was conducted to compare the effectiveness of *Areca catechu* (betel nut) extract and levamisole on survival rate of the third stage larvae (L3) strongyles of goat and to determine effective concentration of betel nut extract (BNE) for larvacidal activity against of L3 strongyles in *in-vitro* condition. Fresh fecal materials of naturally infected goats were collected and the second stage larvae were harvested

after 7 days to estimate their numbers. Methanolic extract of betel nut at 300, 600 and 1200 µg/ml, Levamisole at 10 mg/ml and PBS plus 0.1% DMSO were used to determine their larvacidal effects. BNE at 1200 µg/ml showed 61.70% of L3 died within 24-hours post exposure while Levamisole at 10 mg/ml showed 100% mortality rate of L3 within 2-hours post exposure ($p<0.05$). The highest L3 strongyles death percentage (43.40%) belongs to *Oesophagostomum* sp, followed by 40.90% of *Haemonchus* spand 15.70% of *Trichostrongylus* sp. Although the effects of BNE is not as effective as levamisole, it has a considerable anthelmintic activity against strongyles larvae in goats and can be used as an alternative anthelmintic in future.

KEYWORDS: Betel nut (*Areca catechu*), Strongyles, Larvacidal, Methanol.

# Chapter 1

# INTRODUCTION

## 1.1 Background

Parasitic gastroenteritis (PGE) is the second most important disease of small ruminant in Malaysia causing high morbidity and mortality of the animals (Sani and Chandrawathani, 1996). Goats are more susceptible compared to sheep (Basripuzi *et al.,* 2012; Sani *et al*., 2004) and the common nematodes (mostly strongyles) commonly found in small ruminants are *Haemonchus contortus, Trichostrongylus* and *Oesophagostomum*. *H.contortus* was reported to be the most prevalent species in small ruminant farms in Peninsular Malaysia (Basripuzi *et al.,* 2012; Khadijah *et al.,* 2006a and 2006b).

Because of the extensive use of chemical anthelmintics such as levamisole and mebendazole, their effectiveness is restricted by the development of antihelmintic resistance (Waller, 2002). Thus, increase the usage of organic compounds from plants asa good substitute or alternative to commercial chemical dewormers in order to slow down the development of current anthelmintic drug resistance.

The betel nut (*Areca catechu*) is widely distributed in Southern and Southeast Asia including China, India, Indonesia, Malaysia, Philippines and New Guinea (Amudhan Begum and Hebbar, 2012). Modern investigations demonstrate that betel nut has various pharmacological activities including antiparastic, antioxidant, antibacterial, antifungal, anti-inflammatory, analgesic, anti-allergic, effects on digestive, nervous and cardiovascular system and regulatory effects on blood glucose and lipids (Peng

*et al.,* 2015). Alkaloid is the primary active ingredients in plant-derived medicines (Amirkia and Heinrich, 2014) and it has been reported that arecoline is the main alkaloid in betel nut (Peng *et al.,* 2015; Huang and Michael, 1989). Additionally, arecoline served as the paralyzing agent (antihelmintic alkaloids) in *Areca catechu* targeting the acetylcholine receptors of the parasites which disrupts their nervous systems (Bahmani *et al.,* 2014; Peng *et al.,* 2015). Besides, the betel nut also contains polyphenolic compound such as tannins which possess antioxidant activity (Hannan *et al.,2012).*

## 1.2 Justification

PGE in small ruminants is the most common disease that cause high morbidity and mortality, thus causing economic losses to farmers. The abundance of betel nut in our country will provide an oppurtunity to explore its effectiveness as an alternative anthelmintic. Moreover, it can reduce the problem of drug resistance induced by the chemical anthelmintic drugs. This will helps the farmers to strategize the use of chemical drugs and natural remedies that would bemore economical to them.

## 1.3 Study Objectives

a) To compare the efficacy of processed mature betel nut and levamisole on survival rate of strongyles in goats.

b) To determine the effective concentration of processed mature betel nut extraction against larvacidal activity of strongyles in *in-vitro* condition.

## 1.4 Study Hypothesis

The hypothesis of this study is *Areca catechu* (Betel nut) extracts has an anthelmintic effectagainst the survival rate of L3 strongyles of small ruminants

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