



UNIVERSITI PUTRA MALAYSIA

***FOOT AND MOUTH DISEASE (FMD) IN CATTLE AND BUFFALOES
IN TWO QUARANTINE STATIONS AND SIX SELECTED STATES
OF PENINSULAR MALAYSIA BETWEEN 2010 AND 2015***

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PENINSULAR MALAYSIA BETWEEN 2010 AND 2015**

NIK NUR FATIN AMIRA BINTI NIK KAMARUDIN

A project paper submitted to the
Faculty of Veterinary Medicine, Universiti Putra Malaysia
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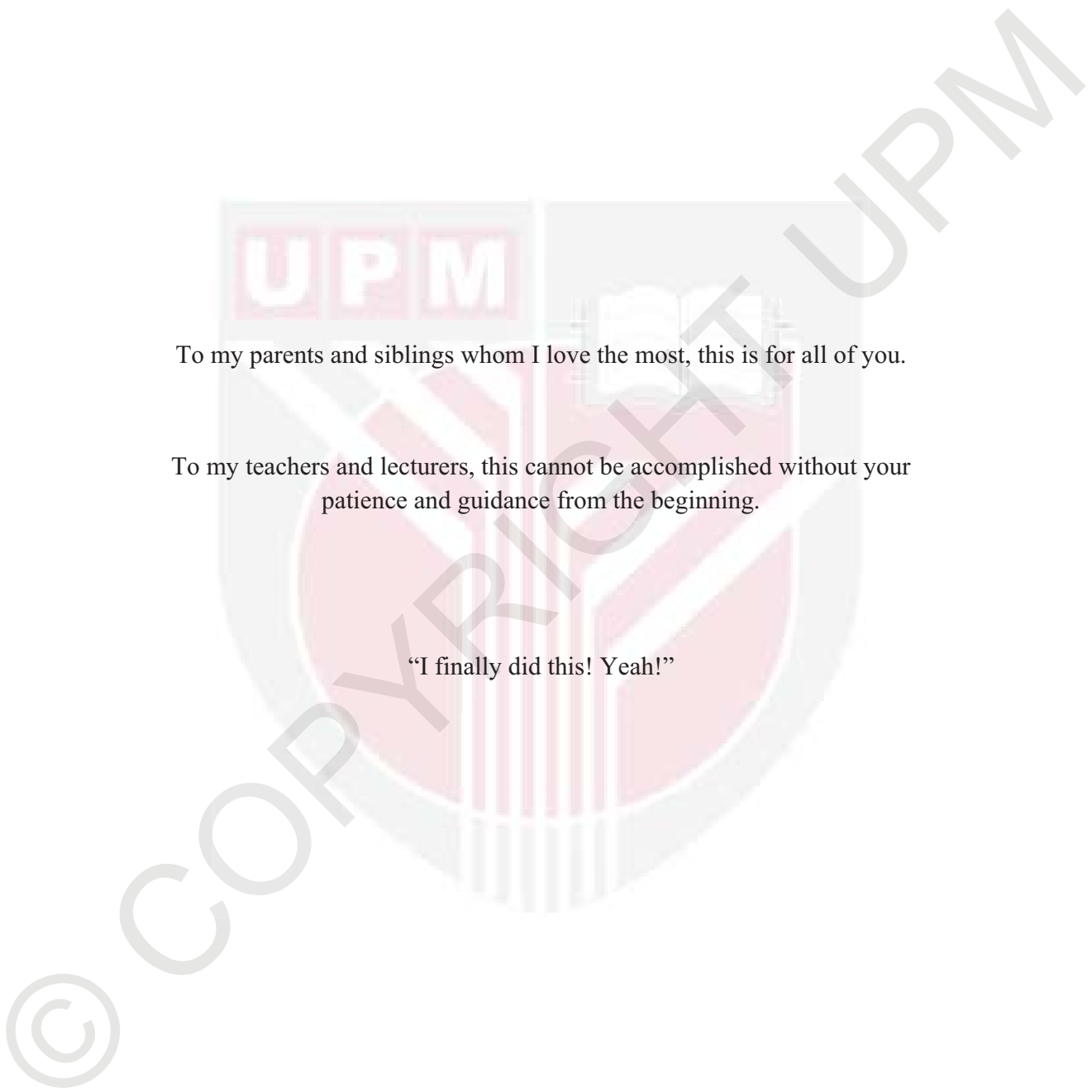
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To my parents and siblings whom I love the most, this is for all of you.

To my teachers and lecturers, this cannot be accomplished without your
patience and guidance from the beginning.

“I finally did this! Yeah!”



It is hereby certified that we have read this project paper entitled “Foot and Mouth Disease (FMD) in Cattle and Buffaloes in Two Quarantine Stations and Six Selected States of Peninsular Malaysia between 2010 and 2015”, by NikNurFatinAmirabintiNikKamarudin and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfillment of the requirement for the course VPD4999 – Project.

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LIST OF ABBREVIATIONS

%	Percentage
APTVM	Arahan Prosedur Tetap Veterinar Malaysia
DVS	Department of Veterinary Service
ELISA	Enzyme-Linked Immunosorbent Assay
FMD	Foot and Mouth Disease
FMDv	Foot and Mouth Disease virus
MAQIS	Malaysia Quarantine and Importation Service
MTM	Malaysia-Thailand-Myanmar
N	Number of sample tested
NSP	Non-structural Protein
OIE	World Animal Health Organization
SEA	South-East Asia
SEACFMD	South-East Asia China Foot and Mouth Disease
SKPB	Padang Besar Animal Quarantine Station
SKRP	Rantau Panjang Animal Quarantine Station
SP	Structural Protein

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan kursus VPP4999- Projek.

**PENYAKIT KUKU DAN MULUT (FMD) PADA LEMBU DAN KERBAU
DI DUA STESEN KUARANTIN DAN ENAM NEGERI-NEGERI
TERPILIH DI SEMENANJUNG MALAYSIA ANTARA TAHUN 2010
DAN 2015**

Oleh

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2016

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Penyakit Kuku dan Mulut (FMD) adalah penyakit berjangkit haiwan berkuku dua. Malaysia merupakan pengimport haiwan ruminant hidup untuk keperluan domestik dan ini memberi risiko kepada industry ruminant tempatan. Pergerakan haiwan terjangkit FMD

merupakan salah satu faktor utama berlakunya wabak. Objektif kajian ini adalah untuk menentukan seroprevalen FMD pada lembu dan kerbau di Stesen Kuarantin Haiwan Padang Besar (PB) dan Rantau Panjang (RP) dari tahun 2010 sehingga 2015, dan untuk menghuraikan wabak FMD di enam negeri-negeri terpilih. Data yang wujud antara tahun 2010 dan 2015 diulas termasuk keputusan ELISA 3ABC protein non-struktur (NSP) FMD yang diperolehi dari Makmal Veterinar Kawasan Kota Bharu, dan data wabak diperolehi dari dalam sesawang Organisasi Kesihatan Haiwan Dunia-Unit Koordinasi Kawasan (OIE-RCU). Berdasarkan ujian NSP tersebut, seroprevalen FMD secara keseluruhan di stesen-stesen kuarantin adalah 36.4% (RP: 40.7%, PB: 34.9%) dan terdapat perbezaan signifikan antara kedua-dua stesen ($\chi^2=42.3$, $df=1$, $p<0.05$). Seroprevalen FMD yang paling tinggi telah direkodkan pada tahun 2011 dan paling rendah pada tahun 2012. Terdapat perbezaan signifikan antara tahun ($p<0.05$). Seroprevalen yang lebih tinggi secara signifikan ($p<0.05$) ditemui pada lembu berbanding kerbau (36.6%, 30.7%, masing-masing) dan jantan berbanding betina (39.1%, 30.4%, masing-masing). Jumlah wabak FMD di negeri-negeri utara Semenanjung Malaysia dari tahun 2010 kepada 2015 adalah 69 (2010 - 19, 2015 - 4). Terengganu merekodkan jumlah wabak yang paling tinggi (26) manakala paling rendah adalah Perlis (1). Wabak FMD bulanan adalah paling

tinggi pada bulan September. Virus serotip O dan serotip O dan A merupakan penyebab utama wabak di negeri-negeri terpilih di Semenanjung Malaysia. Hasil ini menunjukkan FMD adalah endemik di Malaysia dan strategi kawalan perlu dipertingkatkan.

Kata Kunci: *Penyakit Kuku dan Mulut, Lembu, Kerbau, Seroprevalen, Wabak, NSP, ELISA, Stesen Kuarantin, Semenanjung Malaysia.*



ABSTRACT

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

FOOT AND MOUTH DISEASE (FMD) IN CATTLE AND BUFFALOES IN TWO QUARANTINE STATIONS AND SIX SELECTED STATES OF PENINSULAR MALAYSIA BETWEEN 2010 AND 2015

by

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2016

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Co-supervisor: Dr. Siti Zubaidah binti Ramanoo

Foot-and-mouth disease (FMD) is a highly contagious disease of cloven-hoofed animals. Malaysia has been importing live ruminant for domestic demand and this could pose a risk to the local ruminant industry. Movement of FMD infected animals is one of the main factors for outbreaks. The objectives of this

study were to determine the seroprevalence of FMD in cattle and buffaloes in Padang Besar (PB) and Rantau Panjang (RP) Animal Quarantine Stations from 2010 to 2015, and to describe the outbreaks of FMD in six selected states. The existing data between 2010 and 2015 were reviewed including results from the Enzyme-Linked Immunosorbent Assay (ELISA) 3ABC non-structural protein (NSP) of FMD retrieved from the Regional Veterinary Laboratory Kota Bharu, and outbreaks data extracted from the World Organization for Animal Health-Regional Coordination Unit (OIE-RCU) website. Based on the NSP tests, the overall seroprevalence of FMD in quarantine stations was 36.4% (RP: 40.7%, PB: 34.9%) and there was significant difference between both stations ($\chi^2=42.3$, $df=1$, $p<0.05$). The highest seroprevalence of FMD was recorded in 2011 and the lowest in 2012. There was significant difference for seroprevalence between years ($p<0.05$). Significantly higher seroprevalence ($p<0.05$) were also found in cattle than buffaloes (36.6%, 30.7%, respectively), and males than females (39.1%, 30.4%, respectively). The total number of outbreaks of FMD in the northern states of Peninsular Malaysia from 2010 to 2015 was 69 (2010 - 19, 2015 - 4). Terengganu recorded the highest (26) number of outbreaks while the lowest was in Perlis (1). Monthly FMD outbreak occurrence was the highest in September. Virus serotype O and serotype A were the main cause of outbreaks

in the selected states of Peninsular Malaysia. The findings showed that FMD is endemic in Malaysia and control strategies need to be improved.

Keywords: *Foot and Mouth Disease, Cattle, Buffalo, Seroprevalence, Outbreaks, NSP, ELISA, Quarantine Station, Peninsular Malaysia.*



1.0 INTRODUCTION

Foot-and-mouth disease (FMD) is a highly contagious disease of cloven-hoofed animals including cattle, pigs, sheep and many wildlife species (Alexandersenet *al.*, 2003). The FMD virus is classified within the Aphthovirus genus from the family Picornaviridae. According to the Institute for Animal Health, Pirbright Laboratory in the 1st Annual Report on 2003, the viral RNA molecule carries genetic information for viral proteins, namely structural and non-structural proteins (NSP) which are for manufacturing the structural and non-structural part of the virion, respectively.

Common clinical signs accompanying FMD infections are characterized by an acute febrile reaction with vesicular formation consistently in and around the mouth and also around the feet. Vesicles may also be seen on snouts and muzzle, mammary glands and teats, prepuce, vulva and other parts of skin. Lesions will cause pain and lameness to the animal (Alexandersenet *al.*, 2003).

From the study by Hasaballa and Abbo on 2010, the overall prevalence rate of FMD in cattle within the period of 12 years (1996 to 2007) was 11.1% with a case-fatality rate of 0.62%. This disease is considered an important disease in a tropical country such as Peninsular Malaysia and strategic

vaccination has been done at the area close to Thailand to control the disease. However, FMD is now widespread throughout Peninsular Malaysia.

Cattle and buffaloes traded are usually tested serologically to detect the presence of antibodies against FMD virus using the Nonstructural Protein (NSP) Enzyme Linked Immunosorbent Assay (ELISA). This test is useful to differentiate infected from vaccinated animals by detecting the types of antibodies formed. This reflects the circulation of FMD virus in the source country or area.

1.1 Rationale of the study

Malaysia has been importing live animals to meet the domestic demand of red meat (Gleeson, 2002). Since ruminant industry in Malaysia mostly involves smallholder farmers, there is low self-sufficiency level of ruminant products, especially beef, and importation has to occur to allow more ruminants to come in to support the production of milk and meat in Malaysia. However, increase in the intensity of the population, will favor the spread of diseases.

This disease is one of the major Transboundary Animal Diseases (TADs) and can give negative effect to the trade of livestock and their products (Kiboreet *et al.*, 2013). Therefore, the control and eradication of FMD virus is very important in Malaysia as the presence of this virus and manifestation of

clinical symptoms in susceptible animals can strictly cut the exportation of animals, including animal by-products to FMD free-zone country which are high value-markets (Abila and Foreman, 2006).

In this study, the focused areas for seroprevalence study are two government quarantine stations at the northern border of Peninsular Malaysia, which are Padang Besar Animal Quarantine Station in Perlis, and Rantau Panjang Animal Quarantine Station in Kelantan. This study also includes description of outbreak in selected states in Peninsular Malaysia which usually increase during festive seasons. During those times, movements of animal were found to be active and spreads of disease occur, resulting in high number of outbreaks in those selected states.

1.2 Objectives and hypothesis

This study is conducted with the objectives:

- 1) To determine the seroprevalence of FMD in cattle and buffaloes in two animal quarantine stations of Peninsular Malaysia 2010 and 2015.
- 2) To describe the outbreak of FMD in selected northern border states of Peninsular Malaysia between 2010 and 2015.

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