

SEROPREVALENCE OF BLUETONGUE VIRUS INFECTION AMONG SMALL RUMINANT IN FOSTER FARM PROGRAMME FPV, UPM

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SEROPREVALENCE OF BLUETONGUE VIRUS INFECTION AMONG SMALL RUMINANT IN FOSTER FARM PROGRAMME FPV, UPM.

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A project paper submitted to the Faculty of Veterinary Medicine, Universiti Putra Malaysia In partial fulfilment of the requirement for the DEGREE OF DOCTOR OF VETERINARY MEDICINE Universiti Putra Malaysia Serdang, Selangor Darul Ehsan.

MARCH 2017

It is hereby certified that we have read this project paper entitled "Seroprevalence of Bluetongue virus infection among Small Ruminant in Foster Farm Programme FPV, UPM", by Azeef Izzuddin B. Abdul Malek and in our opinion, it is satisfactory in terms of scope, quality and presentation as partial fulfilment of the requirement for the course VPD 4999 Project.

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DEDICATION

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FAMILY

My beloved parents,

My family members.

LECTURERS AND STAFFS

All lecturers and staffs in Faculty of Veterinary Medicine,

Universiti Putra Malaysia

FRIENDS

My wonderful DVM batch 2012 – 2017

All of my coursemates

Thank you all for the support and prayers

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Table 1. Optical densities representation for Positive Control, Negative Control and samples



ABSTRAK

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

Seroprevalens mengenai Jangkitan Bluetongue virus antara Ruminan Kecil dalam Projek

Ladang Angkat FPV, UPM.

Oleh

Azeef Izzuddin B. Abdul Malek

2017

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Bluetongue merupakan sejenis penyakit wajib lapor yang disenaraikan oleh World Organisation for Animal Health (OIE) yang boleh memberi impak yang besar terhadap industry ruminant terutamanya bebiri. Biasanya bebiri akan menunjukkan tanda-tanda klinikal walaubagaimanapun ruminan lain juga akan menunjukkan tanda klinikal. Ladang-ladang kambing yang terlibat dengan Program Ladang Angkat UPM tidak mempunyai informasi yang lengkap mengenai status penyakit ini. Di Malaysia, laporan terakhir yang diketahui adalah pada tahun 1995 dan terdapat outbreak baru pada tahun 2009. Oleh itu, experiment ini telah direka untuk menentukan seroprevalens bluetongue dalam ruminant kecil yang terlibat dengan Program Ladang Angkat UPM dan untuk menentukan factor risiko yang berkaitan dengan seroprevalens penyakit ini. Sampel darah diambil dari 100 ekor kambing tanpa mengira umur, baka dan jantina. Sampel serum darah telah digunakan untuk mengesan antibody terhadap BTV melalui ELISA. Keputusannya adalah negative bagi kesemua sampel. Seroprevalens sifar bagi Bluetongue dalam kajian ini boleh disebabkan langkah-langkah pencegahan yang dilaksanakan oleh Jabatan Perkhidmatan Veterinar (DVS) berdasarkan garis panduan yang ditetapkan oleh Organisasi bagi Kesihatan Haiwan Dunia (OIE). Kesimpulannya, kambing-kambing dari Program Ladang Angkat UPM adalah bebas daripada Bluetongue.

Kata Kunci:Bluetongue, ruminan, kambing, wabak, seroprevalens, serum darah, ELISA.

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999 project.

Seroprevalence of Bluetongue virus infection among Small Ruminant in Foster Farm Programme FPV, UPM.

By

Azeef Izzuddin B. Abdul Malek

2017

Supervisor: Associate Prof.Dr.FaezFirdaus Jesse Abdullah

Co-Supervisor: Prof.DatoDr.MohdAzmiMohd. Lila and Prof. Dr Abdul Aziz Saharee

Bluetongue disease is a notifiable disease listed by the World Organisation for Animal Health (OIE) where it can causes significant problem to the ruminant industry especially in sheep. Sheep usually develops clinical signs, however occasionally other ruminants also acquire the same clinical signs. There is lack of information related to this disease status in UPM's foster farm goats. In Malaysia, the last known report of this disease was in 1995 and recent outbreak was in 2009. Therefore, this experiment was designed to determine the seroprevalence of bluetongue infection among small ruminants in UPM's foster farms and to determine the risk factors associated with the seroprevalence of the disease. Blood samples were collected from 100 goats regardless of their age, breed and gender. The blood serum samples were used to detect the antibody towards Bluetongue virus (BTV) by

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ELISA. The results were negative for all samples. The zero seroprevalence of bluetongue in this study could be due to the prevention measures implemented by the Department of Veterinary Services (DVS) based on the OIE guidelines. Thus, the goats from UPM's foster farms are free from Bluetongue.

Keywords: Bluetongue, ruminant, goat, outbreak, seroprevalence, blood serum, ELISA.



1.0 GENERAL INTRODUCTION

Bluetongue virus (BTV) belongs to the virus family of Reoviridae and genus of Orbivirus. BTV is an arthropod-borne virus transmitted via the bites of midges from the Culicoides spp. genus among its ruminant hosts (Darpelet al., 2009; Kameke, Kampen, & Walther, 2017). There are twenty-six BTV serotypes currently recognised in the world but there are only six in Peninsular Malaysia; BLU1, 2, 3, 9, 16 and 23 (Hassan, 1992; Sharifah et al., 1995). Sheep are the major hosts for Bluetongue where clinical symptoms can be observed while other ruminant hosts are affected subclinically (Joardaret al., 2016). The affected sheep typically have fever, nasal discharges which range from serous to mucopurulent, facial oedema where sometimes may involve the submandibular region and the axillae. Cyanotic tongue, dyspnoea and inflamed coronary band can be observed in severe cases (Darpelet al., 2007). Pregnant ewes that are infected will induce abortions, stillbirths, embryonic death and congenital malformations in lambs while in rams, degeneration of the testis was seen with epididymitis (Osburn, 1994; Bürstelet al., 2009; Belbiset al., 2013). Infections in cattle and goats are usually subclinical but according to Scott, cattle that are infected with BTV will usually have pyrexia, coronary band inflammation, nasal discharges and conjunctivitis (2011). Goats usually have the same signs as the cattle however in some goats, they will only show signs of fever and decrease in milk production (Anonymous, 2015).

The Culicoides are small flies or known as 'biting midges' and the female Culicoides feed on the blood of mammals for reproduction (Mellor *et al.*, 2000). During this

activity, the BTV are transmitted among ruminants. The BTV replicates in the digestive system of the midges and it will be released into the salivary glands. It takes ten to fifteen days for the cycle from infection to transmission takes place and most vectors become infected throughout their life (Eaton *et al.*, 1990; Mellor, 1990, 2000). Other types of arthropods had BTV isolated in them such as sheep ked (Luedke*et al.*, 1965), ticks (Bouwknegt*et al.*, 2010) and mosquitoes (Brown *et al.*, 1992). The disease also can be transmitted via semen from a viraemic bull that contains blood and by placental transmission (Osburn, 1994; Wilson *et al.*, 2008; Saegerman*et al.*, 2011)

Bluetongue cause significant impact to the sheep industry compared to other ruminants as the morbidity rate is 100% while the mortality rate ranges from 2-70% (Anonymous, 2013). The diagnosis of this disease is based on clinical signs, post-mortem findings and epidemiological assessments with laboratory examination (Afshar, 1994). Samples that are examined by the laboratory are non-coagulated blood, serum, tissue samples and also brain tissue from foetuses (Afshar, 1994; Tweedle and Mellor, 2002). BTV isolation in cell lines of insect origin, mammalian BHK-21 or CPAE can be used (Anonymous, 2004; Mecham, 2006). Reverse transcription-polymerase chain reaction (RT-PCR) allows the serotyping of the BTV RNA six months after the infection (MacLachlan*et al.*, 1994). Serological tests for detecting specific antibodies by competitive ELISA allows rapid detection on the 6th post-infection day in the serum or plasma antibody of the infected animals (Koumbati*et al.*, 1999).

The neighbouring countries of Malaysia have various status of Bluetongue for each respective countries. In Iran, the BT seroprevalence would be 89% (Najarnezhad&Rajae, 2013), Lao People's Democratic Republic have a 96% seroprevalence (Douangngeun*et al.*, 2016), Thailand have 75% in indigenous sheeps (Apiwatnakornet al., 1996) and 1.11% was reported in Hokkaido, Japan (Giangaspero, 2012). In India, which is a big country will have a wider range of seroprevalence between 5 - 48.7% (Sodhiet al., 1981; Harbolaet al., 1982; Janakiramanet al., 1991; Chandelet al., 2004; Walton, 2004; Ravishankaret al., 2005; De et al., 2009; Joardaret al., 2014). New Zealand has not have Bluetongue in its country until now while Australia did have an outbreak of this disease before 2000 but the status is not reported at all. China reported to have also a range between 38.6 - 74.4% of seroprevalence for bluetongue (Xu et al., 2016).

In our country, the last reported case were in 1992 by Hassan *et al.* and also 1995 by Sharifah *et al.* Till date, there is no prevalence study being carried out in the Peninsular region. In 2009, there was a positive case confirmed by the laboratory about a small bluetongue outbreak. The number of ruminant farmers are also increasing where they could have a agriculture background or not, making the potential of this disease to be re-introduce is quite high due to the lack of information about diseases and farm management. The Foster farms also have no record about this disease since it started operation. In Europe, around 128 million dollars were used for the implementation of BTV control programmes and surveillances after their latest bluetongue outbreak in 2006, which can increase a nation's budget to maintain the food security (Pinior*et al.*, 2015).

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1.1 THE STUDY RATIONALE

The rationale behind this study based on several factors that are:

- The ruminant industry is increasing in Malaysia among the public with more people venture into agriculture. They obtain their animals from anywhere either the local or the international market that may re-introduce diseases that are considered to be eradicated in Malaysia. Bluetongue can cause significant loss to the sheep industry compared to other ruminant livestock.
- To obtain extra information related to the exposure of BTV among small ruminants in the Foster Farm Programme of FPV, UPM.
- 3) Bluetongue is also understudied in Malaysia as the last research related to this disease was carried out in 1995 and no follow up on the seroprevalence of this disease after that in Malaysia.

1.2 STUDY OBJECTIVES

The objectives of this study are:

- 1. To determine the seroprevalence of bluetongue among small ruminant farms involved in the Foster Farm Programme of FPV, UPM.
- 2. To determine the risk factors and its association towards the seroprevalence of bluetongue from the selected farms in Foster Farm Programme of FPV, UPM.

1.3 HYPOTHESES

The hypothesis for this study would be the seroprevalence of Bluetongue is low or zero in farms involving Foster Farm Programme of FPV, UPM.

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