



**IDENTIFICATION AND CHARACTERIZATION OF INTESTINAL  
MICROSPORIDIA IN JAVAN RUSA (*CERVUS TIMORENSIS*) AND SIKA  
DEER (*CERVUS NIPPON*) IN SUNGAI LEMBING, KUANTAN, PAHANG**

**By**

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## ABSTRACT

Microsporidia are obligate, spore-forming, and intracellular parasite that can cause microsporidiosis in a wide variety of animals and humans. The microsporidia can produce an environmentally resistant spore. *Enterocytozoon bieneusi* is one of the microsporidia species that has been found in both animal and human hosts. This can raise the public health concerns of zoonotic transmission of microsporidia. *E. bieneusi* can also infect enterocytes commonly in the villi hence causing gastrointestinal illness due to necrosis in animals. Previously, the effects of microsporidian infection on farm animals in Malaysia are increasingly being studied. However, there is limited study of microsporidia regarding the molecular genetic characterization of deer species in Malaysia. Thus, this cross-sectional study was carried out on farm deer, which are Javan rusa (*Cervus timorensis*) and sika deer (*Cervus nippon*) in Ladang Rusa Sungai Jin, Pahang by using microscopic and molecular method for specific detection of microsporidia in deer stool samples. The prevalence of *E. bieneusi* in farm deer can be understood by collecting 50 fecal samples from 25 Javan rusa and 25 sika deer regardless of their age and their gender. The stool samples are microscopically examined for microsporidia spores after been stained with Gram-chromotrope Kinyoun staining technique. Then, the identification of *Microsporidia spp.* needs to be confirmed with more specific assay which is the conventional polymerase chain reaction assay. Overall, none of the sample showed positive result by Gram-chromotrope Kinyoun staining and conventional PCR assay. Zero prevalence reported in this study could be determined due to several factors such as different species of deer have been studied, method practice in detection of *E. bieneusi* in deer stool samples, different primers used, and farming mode. Despite the negative results, this study is still being considered important as the workers in this deer farm are from the Orang Asli tribe who lives nearby to this farm. Other than that, this Ladang Rusa Sungai Jin is the largest supplier of deer meat in Kuantan, Pahang. Hence, further studies are needed to practice high sensitivity detection method and diverse species of deer to give accurate and precise epidemiological data, thus the transmission of microsporidia from deer to farm handlers can be fathomed.

# CHAPTER 1

## INTRODUCTION

The term microsporidia is used as a general nomenclature for the obligate intracellular protozoan parasites that belong to the phylum Microspora. According to Sprague (1977), reported that these parasites can infect a wide range of vertebrate and invertebrate hosts. The microsporidia have been reported approximately of 1,300 microsporidian species in 160 genera (Keeling, 2009). There are about 14 microsporidian species have been identified as human pathogens which are; *Enterocytozoon bieneusi*, *Encephalitozoon intestinalis*, *Encephalitozoon hellem*, *Encephalitozoon cuniculi*, *Pleistophora spp.*, *Trachipleistophora hominis*, *Trachipleistophora anthropophthera*, *Nosema ocularum*, *Nosema algerae*, *Vittaforma corneae*, *Microsporidium ceylonensis*, *Microsporidium africanum*, *Brachiola vesicularum*, and *Brachiola connori*. During the AIDS pandemic, their role in human disease was becoming appreciated. The possible causes of diarrheal illness in HIV-infected patients were *E. bieneusi* and *E. intestinalis*. These organisms have increasingly been implicated as the human disease agents; especially act as opportunistic pathogens in the patients with HIV infection and also other immunosuppressed individuals as for examples those with the organ transplantation or chemotherapy recipients (Asmuth *et al.*, 1994). However, it appears to be asymptomatic or self-limited diarrhea in immunocompetent persons (Thellier *et al.*, 2008).

Based on the most of studies done showed *E. bieneusi* was most often of the species detected, then followed by *E. intestinalis*. According to Kotloff *et al.* (2013) states that, pathogens like *Giardia duodenalis*, *Enterocytozoon bieneusi*, *Cryptosporidium*, and *Clostridium difficile* are the main causes of diarrhea