

SEROPREVALENCE OF MELIOIDOSIS AMONG LIVESTOCK IN MALAYSIA FROM 2000-2009

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ABSTRACT. Melioidosis usually results in chronic debilities that reduce the productivity of animals and condemnation of carcasses in abattoir. Melioidosis is re-emerging among animals and humans, and anecdotal reports suggest an increase in disease observation. This study described the seroprevalence of melioidosis in livestock based on the data obtained from the Department of Veterinary Services, Putrajaya and the Veterinary Research Institute, Ipoh. The data were summarized according to animal species, state, and year. The seroprevalence rate in animals was 7.6, 48.2, 2.6, 13.6 and 3.6% in cattle, buffaloes, goats, sheep and pigs respectively. The seroprevalence of the disease varies in different states of the federation. For all species, the seroprevalence vary between 2.6% and 48.2%. The seroprevalence over the years increased from 4.2% in 2000 to 12.0% in 2003 after which it varies between the period 2004- 2007 and apparently declined between 2007 and 2009.

Keywords: seroprevalence, melioidosis, livestock, Malaysia

INTRODUCTION

Melioidosis is a saproozoonosis caused by soil saprophytic bacterium *Burkholderia pseudomallei*. The disease is endemic in Southeast Asia and northern Australia, mostly in areas within latitudes 20°N and 20°S (Currie *et al.*, 2008). It is a significant public health problem because of its propensity to affect poor rural populations, immune-suppressed individuals and the dearth in facilities for its accurate diagnosis in the affected regions (Inglis and Sousa, 2009). The disease is also a significant animal health problem leading to chronic debility that reduce the productivity in animals and loss of valuable animal protein due to condemnation of carcasses at the abattoir (Ketterer *et al.*, 1986; Choy *et al.*, 2000). The disease is mostly transmitted through ingestion and inhalation of contaminated water and/or soil. Animal-to-animal transmission (Choy *et al.*, 2000) as well as human-to-human transmission are rare and animal-to-human or human-to-animal transmission is rare but possible (Dance, 2000). In Malaysia, the disease was

first reported in 1913 (Stanton and Fletcher, 1932) and since then cases have continued to be reported in both humans and animals (Strauss *et al.*, 1969; Puthuchearu *et al.*, 1992; Vadivelu *et al.*, 1995; Norazah *et al.*, 1996; How *et al.*, 2005; Azizi *et al.*, 2005; Puthuchearu, 2009; Deris *et al.*, 2010).

This paper describes the seroprevalence of melioidosis in livestock in Malaysia based on a preliminary examination of the surveillance data gathered by the Department of Veterinary Services, Malaysia and may serve as a useful tool in planning control measures against the disease.

MATERIALS AND METHODS

Data on the continuous surveillance and monitoring of melioidosis in animals for a period of 10 years (2000–2009) were obtained from the Department of Veterinary Services, Putrajaya and Veterinary Research Institute, Ipoh. The data were summarized according to animal species, years of occurrence and states. The test used to determine the presence

of antibodies against *Burkholderia pseudomallei* is the Complement Fixation Test (CFT) and the protocol was as described in the OIE Manual (OIE, 2004). An animal was considered to be positive of the disease if it had antibody titre of 1:8 or more.

RESULTS

Table 1 shows the species-specific seroprevalence of melioidosis in livestock in Malaysia. Out of a total 100,262 animals tested for the disease during the 10-year period, a total of 5,729 (5.7%) were positive for melioidosis. The seroprevalence was observed to be lowest among the goats (2.6%) and highest in buffaloes (48.2%). It should however, be noted that the number of buffaloes tested during the study period was very small and the result may not be truly representative of the actual situation.

Table 2 shows the seroprevalence of melioidosis in livestock in Malaysia based on states during the period under review. The lowest seroprevalence of 0% was observed in cattle in Johor and Kedah

Table 1: Seroprevalence *Burkholderia pseudomallei* in livestock in Malaysia for the period 2000-2009

Species	Positive	Negative	Total	Prevalence %	95% CI*
Cattle	50	625	675	7.6	(5.7, 9.6)
Buffalo	66	71	137	48.2	(40.0, 56.5)
Goats	1870	69980	71850	2.6	(2.5, 2.7)
Sheep	3742	23830	27572	13.6	(13.2, 14.0)
Pigs	1	27	28	3.6	(0.6, 17.8)
Total	5729	94533	100262	5.7	(5.6, 5.9)

* CI= Confidence Interval

Table 2: Seroprevalence (2000-2009) of *Burkholderia pseudomallei* in cattle, buffalo,

State	Species	Positive	Negative	Total	Prevalence (%)
Johor	Cattle	0	90	90	0
	Buffalo	20	49	69	29.0
	Goats	48	6113	6161	0.8
	Sheep	333	5133	5466	6.1
Kedah	Cattle	0	43	43	0
	Goats	81	1142	1223	6.6
	Sheep	365	1673	2038	17.9
Kelantan	Goats	4	988	992	0.4
	Sheep	24	99	123	19.5
Melaka	Goats	8	198	206	3.9
N. Sembilan	Cattle	18	88	106	17.0
	Goats	115	7308	7423	1.5
	Sheep	17	246	263	6.5
P. Pinang	Goats	12	530	542	2.2
	Pigs	1	16	17	5.9
Pahang	Cattle	13	196	209	6.2
	Goats	334	7433	7767	4.3
	Sheep	217	1085	1302	16.7
Perak	Cattle	7	109	116	6.0
	Goats	240	10632	10872	2.2
	Sheep	139	1153	1292	10.8
Perlis	Goats	31	588	619	5.0
Sabah	Cattle	4	36	40	10.0
	Goats	592	13634	14226	4.2
Sarawak	Buffalo	46	19	65	70.8
	Goats	193	6799	6992	2.8
	Sheep	459	4955	5414	8.5
	Pigs	0	11	11	0
Selangor	Cattle	6	34	40	15.0
	Buffalo	0	3	3	0
	Goats	159	12243	12402	13.3
	Sheep	59	1368	1427	4.1
Terengganu	Cattle	2	29	31	6.5
	Goats	53	2372	2425	2.2
	Sheep	2129	8118	10247	20.8

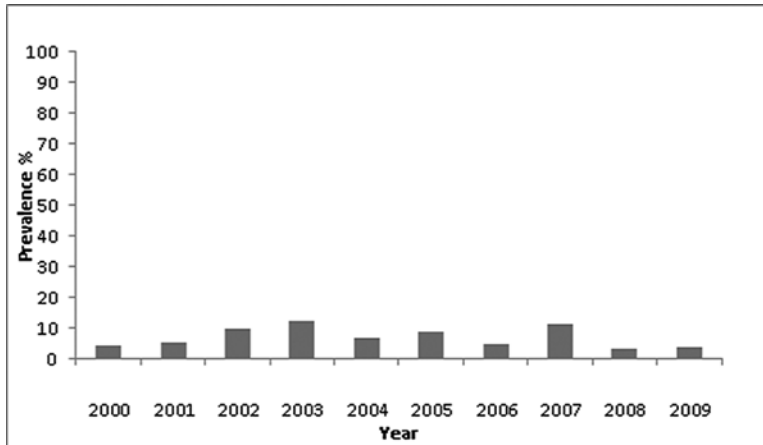


Figure 1: Yearly seroprevalence of melioidosis in livestock in Malaysia from 2000-2009

while the highest seroprevalence of 70.6% was observed in buffaloes in Sarawak during the study period. It should be noted however, that not all the different animal species were tested for the disease in all the states during the study period.

Figure 1 shows the overall yearly seroprevalence of melioidosis in livestock in Malaysia during the period under review. This varies from a low of 3.3% in 2008 to high of 12.0% in 2003. The average yearly seroprevalence across the years was 6.9% while the overall seroprevalence during the period was 6.1%.

DISCUSSION

Evidence of saprozoönotic infection with agent of melioidosis was observed in all livestock species. The apparently low prevalence rate observed among pigs and goats may partly be connected with the management practices where these animal

species mostly kept under intensive system in which they had less contact with soil and therefore at a lower risk of contracting the organism. However, the number of pigs tested in the study is extremely low and this finding may not be truly representative of the situation in pigs. Therefore, more pigs need to be tested to obtain a more accurate result. On the other hand, the relatively high prevalence in buffaloes may partly be as a result of the extensive management system in which they have more contact with soil and therefore at a higher risk of contracting the disease (Pingali, 1997). As earlier indicated with respect to pigs, the number of buffaloes tested during the study period is also extremely low as such the prevalence obtained may not accurately represent of the situation on ground. More buffaloes should have been tested to obtain a more accurate prevalence in the species.

An earlier study conducted covering a ten-year period (1994-2003) in Sabah

(Ouadah *et al.*, 2007) detected melioidosis in 0.2 and 8.0% in cattle and goats respectively from post mortem cases. The present study however found seroprevalence of 10.0 and 4.2% among cattle and goats respectively in the same state the period 2000-2009. These findings may suggest that goats are relatively more susceptible to *Burkholderia pseudomallei* infection leading to higher fatality as compared to cattle. Cattle apparently may be frequently exposed to the organism (leading to higher seroprevalence) but are less likely to succumb to the infection as compared to goats. The country seroprevalence in the cattle (7.6%) in Malaysia was higher compared to that of cattle in Chiang Mai Province of Thailand which reported seroprevalence of 3.0% (Srikitjakarn *et al.*, 2002). Results from studies in other parts of Southeast Asia could not be obtained to make comparisons between the prevalence obtained in this study and those from other parts of the region.

The relative increase in prevalence of the disease in 2003 and 2007 may be associated with increases in number of imported animals and unfavourable weather conditions during the respective years. However, further investigation into this data will explain whether the conjecture is true. For this study, no other factors were investigated to explain the differences observed. However, based on findings from other studies, differences in the environmental factors such as temperature, rainfall, soil type and composition that influence survival

of the agent in the major reservoirs (soil and water) may explain the variations in seroprevalence in space and time (Dance, 2000). The intensity of rainfall during the respective years may also play a role as the intensity of rainfall has been reported to correlate with increase in melioidosis cases (Currie and Jacups, 2003). A study that will help explain the factors that influences the distribution of the bacteria is currently on-going.

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