A SEROLOGICAL INVESTIGATION OF LEPTOSPIROSIS IN SOWS FROM CENTRAL THAILAND

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Abstract. Leptospirosis is a major pig-associated zoonosis worldwide. There are also human occupational disease exposure risks. For better public health and sanitation, the prevalence of this disease was investigated. Four hundred sera were obtained from sows in central Thailand during August 2004 to January 2005 and examined with 20 reference leptospira serovars by a microscopic agglutination test (MAT). The results showed that 10% of samples gave a positive reaction. The most prevalent serovar was grippotyphosa which accounted for 55% of all positive cases. Other minor serovars were canicola and a non-pathogenic strain (patoc). It follows that, the sow may be one of the disease transmitting sources for humans in this area. The disease correlation between pigs, humans and the environments should be evaluated.

INTRODUCTION

Leptospirosis causes reproductive losses in sows, such as abortions, stillbirths and the birth of weak piglets (Ellis, 1999). It is also a major pig-associated zoonosis worldwide. The disease has been reported in both domestic and wild pigs in many countries including Italy (Ebani *et al*, 2003), Australia (Chappel *et al*, 1998; Mason *et al*, 1998), USA (Gipson *et al*, 1999), Portugal (Rocha, 1998), Korea (Choi *et al*, 2001) and Japan (Kazami *et al*, 2002). Diagnosis was done by both bacterial identification and serological techniques, including culturing, IFA, ELISA, PCR and microscopic agglutination assay (MAT) (Miller *et al*, 1989; Chappel *et al*, 1992; Mendoza and Prescott, 1992; Schonberg *et al*, 1992). The gold standard for serosurveillance is MAT. In Thailand, leptospirosis is a major public health problem with over 1,000 morbidity cases in humans annually (Tangkanakul *et al*, 2005) and a high prevalence in rodents (Niwetpathomwat and Doungchawee, 2005). However, studies on leptospirosis in both the environment and in reservoir animals have been few. This study investigated the evidence for leptospirosis in sows from central Thailand, which is the most important pig region in the country.

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MATERIALS AND METHODS

Four hundreds sera were obtained from 10 sow farms in 4 provinces (Nakhon Pathom, Pra Nakhon Si Ayutthaya, Ratchaburi and Saraburi), central Thailand during August 2004 to January 2005. The animal studies were approved by the animal research committee of the Faculty of Veterinary Science, Chulalongkorn University, Bangkok, Thailand. All serum specimens were examined by MAT using 20 reference leptospira serovars including autumnalis, ballum, bataviae, bratislava, canicola, cellidoni, djasiman, grippotyphosa, hardjo, hebdomadis, icterohaemorrhagiae, javanica, patoc, pomona, pyrogenes, ranarum,

saigon, sarmini, shermani, and tarassovi. The reference leptospira were obtained from the National Institute of Health (NIH), Thailand. These serovars were selected as being recommended for the serodiagnosis of leptospirosis in Thailand. Sera that gave a positive reaction at 1:100 dilution were further titrated in a serial two fold dilution to the titer end point, *ie* 50% agglutination (Fig 1).

RESULTS

Ten percent of the numbers examined (40 sera from 400 sera) were positive at a titer of 1:100 and above. The most prevalent serovar was grippotyphosa which accounted for 55% of all positive cases with various titers (ranging from 1:100 to1:6,400). Other minor serovars were canicola, which were 12.5% of all positive cases with a low titer response (titer range 1:100-1:200) (Table 1). The non pathogenic serovar (patoc) was detected in 32.5% of positive cases with a titer of 1:100.

DISCUSSION

The MAT titers from this study varied, as was reported by Kazami *et al* (2002), with the titers ranging from 1,000 to 30,000. A detectable level of the antibodies was found approximately 5-10 days after infection and reached a maximum level around 3 weeks after infec-

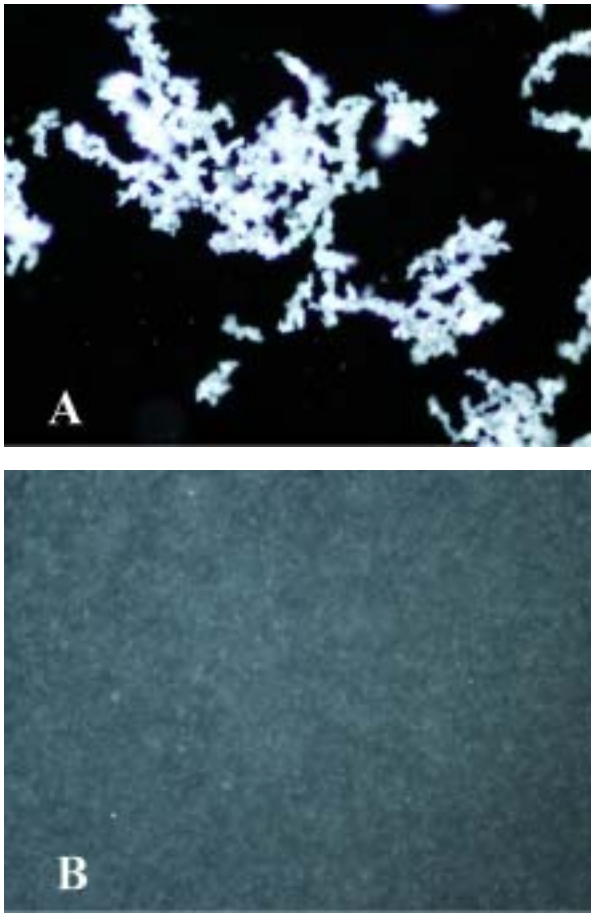

Fig 1–The microscopic agglutination reaction of *Leptospira interrogans* serovar canicola; A was the titer end point of 50% agglutination, B was the negative control (400x magnification).

Table 1
The MAT titer of three positive leptospirosis serovars from 400 sow serum samples.

Prevalence serovars	Number of total positive cases	Number (%) of positive cases on each titer						
		6,400	3,200	1,600	800	400	200	100
grippotyphosa	22	1(4.5)	0(0)	0(0)	1(4.5)	2(9.2)	3(13.6)	15(68.2)
canicola	5	0(0)	0(0)	0(0)	0(0)	0(0)	1(20)	4(80)
patoc	13	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	13(100)

Prevalent serovars are listed in the table for grippotyphosa, canicola and patoc. The other 17 reference leptospira serovars, autumnalis, ballum, bataviae, bratislava, cellidoni, djasiman, hardjo, hebdomadis, icterohaemorrhagiae, javanica, pomona, pyrogenes, ranarum, saigon, sarmini, shermani and tarassovi were negative for the MAT (titer under 1:100).

tion (Ellis, 1999). The prevalent serovars in this study were grippotyphosa, canicola and patoc; their presence dependant on the geographic location and the duration of surveillance. The most prevalent serovars reported in Australia were *L. interrogans* serovar pomona, which were found in 2.7% (Victoria 0.6%, New South Wales 1.3%, South Australia 25.2%) out of a total of 6,511 sera from 228 herds (Chappel *et al*, 1998). In the Mekong delta, in Vietnam, the most common was *Leptospira interrogans* serovar autumnalis (32%), bratislava (29%), grippotyphosa (13%), icterohaemorrhagiae (27%), pomona (5%), and tarassovi (13%). Seropositivity for serovar tarassovi was associated with increased numbers of dead piglets and serovar grippotyphosa, with a 1-day longer period from weaning to service (Boqvist *et al*, 2002). In Japan, the sera of sows from the Chiba Prefecture, showed significantly higher antibody titers to serovar copenhageni in 8 out of 40 sows sampled, and antibody titers greater than 10,000 in 6 of them. Significantly higher antibody titers to serovar icterohaemorrhagiae and canicola were confirmed in 4 and 8 of the 40 sows, respectively (Kazami *et al*, 2002). Although, many studies show a high prevalence of leptospirosis in pigs, the risk of exposure to swine leptospirosis for humans in some areas was questionable. Ribotta *et al* (1999) considered the risk of swine leptospirosis as an occupational zoonosis in Quebec, Canada. Their results showed a negative reaction for serovars pomona, icterohaemorrhagiae, hardjo, grippotyphosa and autumpnalis, while 8.8% of the sera were positive for serovar bratislava. The opportunity for exposure to leptospirosis is low for people in contact with pigs in Quebec (Ribotta *et al*, 1999). In conclusion, swine leptospirosis can be found in central Thailand with low antibody titer response and quite low prevalence. The value of swine leptospirosis vaccination for disease prevention in epidemic areas should be further evaluated. For public health prevention strategies, the risk of exposure to swine leptospirosis for humans in Thailand should be further analyzed.

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