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Seroprevalence of *Chlamydia* Infection in Pigs from Intensive Farms in Southern China

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Abstract: The present investigation aimed to examine the prevalence of *Chlamydia* infection in pigs in Guangdong Province, Southern China. Between March 2008 and May 2009, a total of 1,017 serum samples were collected from 15 intensive farms, which are distributed in 12 administrative cities of Guangdong Province and assayed for *Chlamydia* antibodies by Indirect Hemagglutination Assay (IHA). The results showed that almost all of the investigated farms showed seroprevalence (93.33%, 14/15). The average seroprevalence of pigs with *Chlamydia* antibodies was 30.78% (ranged between 0-88%) with breeding boars having the highest prevalence (63.38%, 45/71), which was followed by breeding sows (41.10%, 60/146) and fattening pigs (36.25%, 29/80). These results indicated that prevalence of *Chlamydia* infection in pigs from intensive farms in Southern China is high, therefore integrated and improved control strategies and measures should be implemented to prevent and control *Chlamydia* infection in pigs.

Key words: Seroprevalence, pigs, southern China, Indirect Hemagglutination Assay (IHA), *Chlamydia*

INTRODUCTION

Chlamydia sp. is an obligate intracellular infectious agent with a broad host spectrum and causes a wide range of diseases including enteritis, perinatal mortality, pneumonia and reproductive disorders, particularly abortion and endometritis in humans and *Chlamydia* abortion syndrome in animals, such as abortion, stillbirth and fetal mummification (Kauffold *et al*., 2006; Zhong, 2009).

It also causes serious diseases in pigs including epididymitis and vesiculitis in breeding boars, vaginitis and endometritis in breeding sows, chronic pneumonia and keratitis in piglets and death in young pigs (Busch *et al*., 2000; Longbottom, 2004; Pantchev *et al*., 2009; Reinhold *et al*., 2009).

Prevalence of *Chlamydia* infection in pigs has been reported in many countries such as Australia, Germany, Switzerland (Eggemann *et al*., 2000; Vanrompay *et al*., 2004; Kauffold *et al*., 2006; Pantchev *et al*., 2009) and in a number of provinces in China (Cao and Zhang, 2007; He *et al*., 1995; Wang and Zhou, 2009), while there was limited investigations in South China. Guangdong Province is located in southern China, which is the largest producer of intensively raised pigs in China and a significant proportion of the pigs were sold to Hong Kong and Macao Special Administrative Regions of China for human consumption. The objective of the present investigation was to examine the seroprevalence of *Chlamydia* infection in pigs in Guangdong Province and the expected results would provide base-line data for the improved prevention and control of swine infection with *Chlamydia*.

MATERIALS AND METHODS

Pig serum samples: From March 2008-May 2009, a total of 1,017 pig blood samples were collected from 15 intensive farms distributed in 12 administrative cities of Guangdong Province, including 71 breeding boars, 146 breeding sows, 113 growing pigs, 80 fattening pigs, 55 piglets and 552 slaughter pigs. Serum samples were obtained by centrifugation at 3,000 g for 10 min and stored at -20 C until analysis by Indirect Hemagglutination Assay (IHA).

Detection reagents: Pig antibodies to *Chlamydia* were determined using a commercially marketed IHA kit purchased from Lanzhou Veterinary Research Institute, Chinese Academy of Agricultural Sciences.

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Detection procedure: The detection procedure followed the manufacturer's instructions. In brief, 75 μL of IHA dilution solution was transferred into a 96-well V bottomed reaction plate with 25 μL of serum sample added and mixed gently with pipette. About 25 μL of the mixture was 4-fold gradually diluted into another 2 holes and 25 μL mixture in the third hole was discarded at last to maintain 75 μL system. The dilution in the 3 wells was 1:4, 1:16 and 1:64, respectively. Positive, negative and blank controls were included at the same plate. After 25 μL *Chlamydia* antigen was added to each well, the plate was shaken slightly with a vibrator for 2 min followed by incubation at 37°C for 2 h. The test was considered positive, when a layer of agglutinated erythrocytes was formed in wells at dilutions of 1:16 or higher.

RESULTS AND DISCUSSION

Prevalence of *Chlamydia* infection in different farms: The survey of pigs from 15 different farms by IHA showed that only one farm (Zengcheng) was *Chlamydia* negative, while the others were positive (93.33%, 14/15). Prevalence of pigs with *Chlamydia* infection was 30.8% in average and 0-88% in range. Huazhou farm had the highest prevalence of 88%, which was followed by Qingyuan and Jiangmen farms with prevalence of 66.18 and 50.82%, respectively. Three cities named Zengcheng (0), Lianjiang (1.59) and Yunfu (1.79%) had low prevalence (Table 1).

Prevalence of *Chlamydia* infection in different categories of pigs: Among the 1,017 tested pig serum samples, breeding boars showed the highest prevalence of 63.38%, followed by breeding sows (41.10%) and the fatting pigs (36.25%). The growing pigs had the lowest prevalence of 6.19% (Table 2).

The prevalence of *Chlamydia* infection in pigs in southern China's Guangdong Province (30.78%) reported in the present study was lower than that of Henan (54.1%) (Lang *et al*., 2005), similar to that of Hubei (31.77%) (Qiu *et al*., 1998) and Gansu (34.4%) (Gao *et al*., 2003) but higher than that of Ningxia (24.14%) (He *et al*., 1995).

The investigation revealed that the prevalence of *Chlamydia* infection in pigs in southern China is high, especially in breeding boars. Previous studies have shown that *Chlamydia* could spread through semen and pigs can also be infected by contaminated faeces. The high prevalence in breeding boars may cause the wide transmission of *Chlamydia* in breeding sows and other pigs, similar to what have been observed in cattle and horses (Kauffold *et al*., 2006).

Table 1: Prevalence of *Chlamydia* infection in different pig farms examined by Indirect Hemagglutination Assay (IHA)

Farms	Examined no.	Positive no.	Prevalence (%)
Lianjiang	63	1	1.590
Jiangmen	61	31	50.82
Yangjiang	86	33	38.37
Zhanjiang	494	143	28.95
Yangchun	41	7	17.07
Heyuan	32	14	43.75
Foshan	28	9	32.14
Yunfu	56	1	1.790
Zengcheng	30	0	0.000
Huazhou	25	22	88.00
Conghua	33	7	21.21
Qingyuan	68	45	66.18
Total	1017	313	30.78

Table 2: Prevalence of *Chlamydia* infection in different categories of pigs by Indirect Hemagglutination Assay (IHA)

Pigs	Examined no	Positive no.	Prevalence (%)
Breeding boars	71	45	63.38
Breeding sows	146	60	41.10
Growing pigs	113	7	6.190
Fattening pigs	80	29	36.25
Piglets	55	7	12.73
Slaughter pigs	552	165	29.89

CONCLUSION

The results of the present investigation indicated that prevalence of *Chlamydia* infection in pigs from intensive farms in southern China is high, in particular in breeding boars. Therefore, integrated and improved control strategies and measures should be implemented to prevent and control *Chlamydia* infection in pigs.

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