Seroprevalence of *Chlamydia* infection in pigs in Jiangxi province, south-eastern China

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*Chlamydia* are Gram-negative obligate bacteria that cause a wide range of diseases in humans and animals. To assess the risk of zoonosis posed by pigs, a total of 920 serum samples were collected from pigs in 11 administrative cities in Jiangxi province, south-eastern China, and the seroprevalence of *Chlamydia* antibodies was investigated by an indirect haemagglutination assay. The pathogen-specific antibodies were detected in 539 (58.59%) pigs with seroprevalence ranging from 33.33% (Jingdezhen) to 90.91% (Pingxiang) among different cities (P<0.05). The highest prevalence was found in pregnant sows (80.89%, 127/157), followed by breeding boars (79.37%, 50/63), suckling sows (77.01%, 67/87), fattening pigs (69.32%, 61/88) and non-pregnant sows (62.5%, 180/288). Piglets had the lowest prevalence of 22.78% (54/237). The seroprevalence of *Chlamydia* infection among different categories of pigs was also significantly different (P<0.05). These results indicate that *Chlamydia* is highly prevalent in pigs in Jiangxi province and our results indicate that the presence of *Chlamydia* exposure in pigs may pose a potential threat to human health.

**METHODS**

**Investigation site.** The present investigation was carried out in Jiangxi province, south-eastern China (Fig. 1). Jiangxi province, a
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RESULTS AND DISCUSSION

Chlamydia infection can result in a broad range of diseases in both humans and animals, including pigs, causing health problems and heavy economic losses. However, epidemiological data regarding the distribution of animal chlamydiiosis in China are scarce. This study aimed to estimate Chlamydia seroprevalence of pigs in this region. Blood samples were collected from pigs in Jiangxi province and specific antibodies to Chlamydia were detected in 539 (58.59%) out of 920 serum samples by IHA at a 1:16 cut-off. The positive samples were distributed among all 11 administrative cities with the prevalence ranging from 33.33% (Jingdezhen) to 90.91% (Pingxiang) with statistically significantly different prevalences between cities (Table 1). The prevalence in different categories of pigs ranged from 22.78% to 80.89%. The highest seroprevalence was found in pregnant sows (80.89%, 127/157), followed by breeding boars (79.37%, 50/63), suckling sows (77.01%, 67/87), fattening pigs (69.32%, 61/88), non-pregnant sows (62.5%, 180/288) and piglets (22.78%, 54/237). The difference in prevalence was statistically significant among different types of pigs ($P<0.05$) (Table 2).

Several studies have reported Chlamydia prevalence in pigs in various geographical regions. Studies have reported an overall 63.6% seroprevalence of Chlamydia among wild boars in Italy (Di Francesco et al., 2011), and 95.83% prevalence in pigs from the major pig-producing areas of Sweden (Englund et al., 2012), by PCR. The overall seroprevalence of Chlamydia in pigs in Jiangxi was 58.59%, which was lower than that in Sweden and Italy but higher than that detected in other provinces in China. For example, Zhou et al. (2008) used IHA and detected an overall 27.71% seroprevalence of Chlamydia among pigs in Fujian province and Li (2005) reported a 22.25%...
seroprevalence of *Chlamydia* in pigs in partial-intensive farms in Hunan province, by IHA. A recent study also found a high prevalence of *Chlamydia* infection/exposure in pigs (49.49%) in Hainan province (Suo et al., 2005).

In comparison, the overall seroprevalence of *Chlamydia* infection in pigs in Jiangxi province was much higher than that in other provinces in China (Li, 2005; Suo et al., 2005; Zhang et al., 2013; Zhou et al., 2008). The differences in the seroprevalence of *Chlamydia* exposure in pigs in different provinces could be related to differences in ecological and geographical factors such as temperature, rainfall or landscape differences. Sanitation, husbandry practices and animal welfare in pig production could be other reasons for the variation. The high sensitivity of the serological methods used to determine *Chlamydia* prevalence may also be a factor contributing to the observed differences.

In this study, we also found that the prevalence was diverse in different types of pigs. Compared with piglets, the prevalence of *Chlamydia* infection in sows and breeding boars was much higher, as also reported in other studies (Geigenfeind et al., 2012; Li, 2005; Suo et al., 2005; Xu et al., 2010). The relatively lower prevalence of *Chlamydia*-specific antibodies in piglets may be attributed to lower exposure through better healthcare and less chance of contact with contaminated food, water or faeces, which play an important role in transmission. Among different types of sows, pregnant sows had a higher seroprevalence than suckling and non-pregnant sows, possibly due to *Chlamydia* acquisition through semen as described previously (Kauffold et al., 2006). As sexually transmitted diseases, the high observed levels of *Chlamydia* seroprevalence in boars may increase the risk of infection of sows during copulation.

Pork is consumed widely in China for cultural and economic reasons and is highly esteemed in Chinese cuisine. Although no cases of transmission of *Chlamydia* from pigs to humans have yet been reported, it is presumed that persons in direct contact with infected pigs might be at increased risk. Jiangxi province is close to the Shanghai Municipality and the Hong Kong Special Administrative Region. Due to this geographical location, most of the pork is sold to Shanghai and Hong Kong, with the remainder being consumed by Jiangxi locals. The high prevalence of *Chlamydia* infection in pigs in Jiangxi province is therefore a public health concern, not only for local people, but also for the people living in Shanghai or Hong Kong.

The pig serum samples used in the present study were collected in Jiangxi province between January and December 2012, a relatively short period of time, so our results may not reflect the status of *Chlamydia* infection over longer periods. However, our results provide helpful information for future studies where it would be valuable to isolate and identify *Chlamydia* strains from pigs infected with chlamydiosis in Jiangxi province.

### Table 2. Seroprevalence of *Chlamydia* infection in different categories of pigs in Jiangxi Province, south-eastern China

<table>
<thead>
<tr>
<th>Categories</th>
<th>No. examined</th>
<th>No. positive</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnant sow</td>
<td>157</td>
<td>127</td>
<td>80.89</td>
</tr>
<tr>
<td>Suckling sow</td>
<td>87</td>
<td>67</td>
<td>77.01</td>
</tr>
<tr>
<td>Non-pregnant sow</td>
<td>288</td>
<td>180</td>
<td>62.5</td>
</tr>
<tr>
<td>Breeding boar</td>
<td>63</td>
<td>50</td>
<td>79.37</td>
</tr>
<tr>
<td>Fattening pig</td>
<td>88</td>
<td>61</td>
<td>69.32</td>
</tr>
<tr>
<td>Piglet</td>
<td>237</td>
<td>54</td>
<td>22.78</td>
</tr>
<tr>
<td>Total</td>
<td>920</td>
<td>539</td>
<td>58.59</td>
</tr>
</tbody>
</table>

### Conclusions

The results showed that *Chlamydia* infection in pigs is remarkably high in Jiangxi province, south-eastern China, especially in pregnant sows and breeding boars, which raises a potential public health concern because pigs may be reservoir hosts of *Chlamydia* infection in humans.

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### REFERENCES


