

## Seroprevalence of Antibodies Against Three Food Safety-Related Porcine Pathogens in Guizhou Province, Southwestern China

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**Abstract:** The 946 serum samples were tested for antibodies against three porcine infectious agents in this study. The results showed the presence of antibodies to *Salmonella* in 53.70% of samples (508/946) to *Trichinella* in 3.81% of samples (36/946) to *Yersinia* in 65.33% of samples (618/946) and relevant herd positive rates were 54.55% (30/55), 7.27% (4/55) and 67.27% (37/55) correspondingly. Scaled farms or total farms (scaled and individual) displayed lower seroprevalence for *Trichinella* of 1.88% (10/532) or 2.44% (16/656) when compared to 6.90% (20/290) for abattoirs ( $p \leq 0.01$ ) and individual farms showed lower seroprevalence for *Yersinia* of 37.10% (46/124) when compared to 71.80% (382/532) for scaled farms and 65.52% (190/290) for abattoirs ( $p \leq 0.01$ ). These demonstrated specific circulation of porcine *Salmonella*, *Trichinella* and *Yersinia* among pigs in some regions of Guizhou Province.

**Key words:** Antibody, ELISA, *Salmonella*, *Trichinella*, *Yersinia*

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### INTRODUCTION

The problem of food safety is topical in reference to epizootic, epidemic and social situations. Farm animals, especially swine are often involved in the circulation of pathogenic agents in nature there by it is of great significance to monitor relevant agents such as *Salmonella*, *Trichinella* and *Yersinia* among domestic pigs. *Salmonella* species colonize a wide range of hosts and all the major livestock species can become colonized, frequently asymptotically eventually producing contaminated meat and other food products. Food-borne outbreaks of salmonellosis are routinely observed and frequently reported (Newell *et al.*, 2010). *Trichinella* species can infect swine, horses, wild animals while human infection caused by domestic pigs varies from country to country such as decreased incidence of Trichinellosis in the United States resulted from changes in pork industry management standards and government regulations (<http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5809a1.htm>) and hundreds or thousands of cases annually reported in other countries of Eastern Europe and Asia (<http://en.wikipedia.org/wiki/Trichinella>).

*Yersinia* is a genus of bacteria in the family Enterobacteriaceae which are Gram-negative rod shaped facultative anaerobic bacteria with some members being pathogenic in humans in particular, *Y. pestis*, the first

described and identified species in 1894 by A.E.J. Yersin, is the causative agent of the plague (<http://en.wikipedia.org/wiki/Yersinia>).

Many researches in different countries were devoted to the study of circulation of porcine infectious agents. But in recent years the situation on many topical porcine infectious diseases among domestic pigs in Southwestern China's Guizhou Province remained uncertain. the research aimed at testing sera from swine for the presence of antibodies to three economically and socially significant porcine infectious agents: *Salmonella*, *Trichinella* and *Yersinia*.

### MATERIALS AND METHODS

**Preparation of serum samples:** A total of 946 sera were selected from blood samples which were submitted to Guizhou Animal Disease Control Center from Jan 2011 to Dec 2013 in 9 regions of Guizhou Province. All sera were harvested by centrifugation for 15 min at 3000 rpm and heat inactivated at 56°C for 30 min.

**Serological examination:** Sera were tested using commercially available swine *Salmonella*, *Trichinella* and *Yersinia* antibody test ELISA kits (SALMOTYPE® Pig Screen, PIGTYPE® *Trichinella* Ab and PIGTYPE® YOPSCREEN, Labor Diagnostik Leipzig, Germany).

**Statistical analysis:**  $\chi^2$ -test calculator (Version 1.61) was downloaded (<http://www.ziyuesoft.net>) and used to test the difference between relevant herds.

**RESULTS AND DISCUSSION**

A total of 946 sera were tested for seroprevalence for Salmonella, Trichinella and Yersinia and the serologic results were presented in Table 1. Antibodies were detected against Salmonella (53.70%), Trichinella (3.81%), Yersinia (65.33%), Salmonella and Trichinella (3.06%), Salmonella and Yersinia (35.94%), Trichinella and Yersinia (3.8%), Salmonella and Trichinella and Yersinia (3.2%) and relevant herd positive rates were 54.55, 7.27, 67.27, 5.45, 40.00, 7.27 and 5.45%, correspondingly. No differences between scaled individual farms or abattoirs were observed for Salmonella ( $p>0.05$ ).

Scaled farms displayed lower seroprevalence of 1.88% (10/532) when compared to 6.90% (20/290) for abattoirs ( $p\leq 0.01$ ) while no differences between individual and scaled farms or between individual farms and abattoirs were observed for Trichinella ( $p>0.05$ ).

Individual farms showed lower seroprevalence of 37.10% (46/124) when compared to 71.80% (382/532) for scaled farms and 65.52% (190/290) for abattoirs ( $p\leq 0.01$ ) while no differences between scaled farms and abattoirs were observed for Yersinia ( $p>0.05$ ).

No differences between total farms (scaled and individual) and abattoirs were observed ( $p>0.05$ ) for Salmonella or Yersinia and differences were observed for Trichinella with lower seroprevalence of 2.44% (16/656) for total farms than 6.90% (20/290) for abattoirs ( $p\leq 0.01$ ).

The results of the study showed a higher seroprevalence for Salmonella and Yersinia and a lower seroprevalence for Trichinella in Guizhou Province, Southwestern China. According to the literature, antibodies to Salmonella were often detected in different countries. In USA, from low-volume producers, 1,863 of 25,478 (7.3%) samples had antibodies against Salmonella, of the 6,299 lots of swine tested, 1,191 (18.9%) contained at least 1 sample with positive results while from high-volume producers, 203 of 2,486 (8.1%) samples and 124 of 629 lots had positive results (O'Connor *et al.*, 2006).

In Canada, at least one pig tested sero-positive on 98% of the dry-feeding farms and 84% of the liquid-feeding farms ( $p<0.05$ ) which showed that the Salmonella sero-prevalence differed between the two groups of farms and further logistic regression showed that dry-feeding and continuous flow system increased risk of finding Salmonella in the individual pig while liquid-feeding and all-in all-out management of the grower-finisher barns can reduce the Salmonella prevalence (Farzan *et al.*, 2006). In the study, high individual and herd positive rates of 53.70 and 54.55% in apparently healthy pigs indicated the potential risk for food-borne disease, contaminated environments and transmission vectors such as feed, boots and vehicles and so on may probably contribute to the transmission and distribution of Salmonella to pigs in the province.

A serological survey in Ireland found antibodies against Yersinia YOP (Yersinia Outer Proteins) in 25% with an age-related trend to increased seropositivity, compatible with the hypothesis that yersiniosis may have been more prevalent (Ringwood, 2013). Among domestic animals, pigs are considered the major reservoir of *Y. enterocolitica* bioserotype 4/O:3, the pathogen is found in pig carcasses and pluck sets at slaughterhouses. By the time of slaughter, 28% of pigs were shedding the pathogen in feces and antibodies against Yersinia were found in 88% of pigs (Virtanen, 2014). In this study, researchers detected antibodies to Yersinia in 65.33% of samples (618/946) and relevant herd positive rates was 67.27% (37/55) the high prevalence of anti-Yersinia-antibodies demonstrated the need for further epidemiological surveillance and animal studies to assess consumer's endangering especially in the units of weaned piglets and fattening pigs and buying piglets from more than one supplier at a time.

Trichinella infection has been documented in domestic animals (mainly pigs) and wildlife. Trichinellosis is one of the most important foodborne parasitic zoonoses in China and most of the outbreaks occur in 10 provinces with the prevalence of *T. spiralis* in pigs reaches 50% (Pozio, 2007). In this study, researchers detected antibodies to Trichinella in 3.81% of samples (36/946) and relevant herd positive rate was 7.27% which indicated

**Table 1: Seroprevalence of antibodies against three porcine pathogens**

Agents	Positive ratio of scaled farms		Positive ratio of individual farms		Positive ratio of abattoirs		Total positive ratio	
	Herd	Individual	Herd	Individual	Herd	Individual	Herd	Individual
Salmonella	14/22	280/532	7/16	68/124	9/17	160/290	30/55	508/946
Trichinella	1/22	10/532	1/16	6/124	2/17	20/290	4/55	36/946
Yersinia	18/22	382/532	6/16	46/124	13/17	190/290	37/55	618/946
ST	1/22	10/532	0/16	0/124	2/17	19/290	3/55	29/946
SY	13/22	210/532	1/16	10/124	8/17	120/290	22/55	340/946
TY	1/22	10/532	1/16	6/124	2/17	20/290	4/55	36/946
STY	1/22	10/532	0/16	0/124	2/17	21/290	3/55	31/946

geologically isolated Guizhou Province has its specific epidemic cycle. Considering scaled farms and total farms displayed lower seroprevalence when compared to abattoirs buying fattening pigs from outer suppliers may be a risk factor.

### CONCLUSION

The presence of antibodies against *Salmonella*, *Trichinella* or *Yersinia* in relevant samples demonstrated specific circulation among pigs in some regions of Guizhou Province and urgent need for further epidemiological surveillance and animal studies to assess consumer's endangering.

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