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Detection of antibody to porcine reproductive and respiratory syndrome virus from pig sera collected during the period of January to December 2000

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Abstract

During the period of January to December 2000, a total of 3,505 swine sera was collected from 208 farms, which are located throughout country, for the diagnosis of porcine reproductive and respiratory syndrome(PRRS). The antibody to porcine reproductive and respiratory syndrome virus(PRRSV) was tested by indirect immunofluorescent antibody(IFA) test. Of 208 farms tested, at least one or more than one pigs was positive for PRRSV antibody in 188(90.4%) farms. The overall seroprevalence of PRRSV antibody was 45.1% (1581/3505). Most pigs were infected with PRRSV at around 50- to 60-day old. The seroprevalence of antibody varied with age. The highest seroprevalence of PRRSV antibody was observed in the growing pigs at around 80-day old. About one-thirds of adult pigs including boar, gilt and sow were positive to PRRSV antibody. In many farms, the infection of PRRSV was chronic and confined to grower and/or finisher. However, antibody was detected from all production phase in some farms.

Key words : PRRS virus antibody, Seroprevalence

Introduction

Porcine reproductive and respiratory syndrome(PRRS) had emerged in the late 1980's in the United States of America. The etiologic agent of PRRS is porcine reproductive and respiratory syndrome virus (PRRSV) and was first isolated by Wensvoort at the Central Veterinary Institute in the Netherlands[1)]. Soon afterwards, Ohlinger et al[2)] in Germany, and Collins et al[3)] in the United States reported that they had isolated the virus. The PRRV is a member of the family *Arteriviridae,* in the

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order *Nidovirales*[1,4]. The PRRSV affects pigs of all ages and causes poor conception rates. The first sign in affected herds was inappetence or anorexia in adult pigs with pyrexia(39~41℃). Reproductive failure characterized by late-term abortion(premature farrowings), increased the number of stillborn and mummified fetuses, and to a lesser extent, decreased farrowing rates[1~3]. High preweaning mortality due to the birth of low viability pigs and respiratory disease was observed. In the growing and finishing pigs, respiratory disease of varying degrees due to a secondary bacterial infection was noted. After acute outbreak, PRRSV infection has been known to be endemic infection and defined to a certain production phase such as nursery, grower, and/or finisher[5]. The primary mode of the PRRSV transmission between herds was due to introduction of infected pigs. Chronic or persistent carrier status has been demonstrated in the swine following PRRSV infection, and the carrier pigs are believed to be the major source of the virus transmission[6]. Airborne transmission has been implicated in some cases in European countries. Artificial insemination with contaminated semen may play an important role in virus transmission[7,8]. Some prevention and eradication measures such as depopulation / repopulation, test and removal, modified medicated early weaning or partial depopulation have been introduced[9~11]. A spontaneous elimination of the PRRSV infection was observed in farrow-to-finish herd[10,11]. The partial depopulation of infected swine herds seems to be an effective methods in eradication of PRRS when the PRRSV infection is defined to a certain production phase. Vaccination strategies for the PRRSV prevention may be successful to the herd where the PRRSV infection is stabilized. There is no effective treatment for the PRRSV infection. Most treatments are intended to provide supportive therapy until the acute signs have subsided. Diagnosis of PRRS has been mainly done by the IFA test, ELISA and virus isolation[12~14].

In this study, we examined PRRSV antibody from a total of 3,505 swine serum samples which were submitted to us for the diagnosis of PRRS during the period of January to December 2000.

Materials and Methods

Cell culture

The MARC-145 cells were maintained in Eagle's minimum essential medium(Sigma, U.S.A), which was supplemented with 3% fetal bovine serum(Gibco, U.S.A), 0.15% sodium bicarbonate, and antibiotics[12,15].

Serum samples

A total of 3,505 were submitted from nationwide during the period of January to December 2000.

IFA test

The indirect immunofluorescent antibody test was used for the detection of PRRSV antibody from the swine serum[12,13,15]. The MARC-145 cells were cultured in 96-well microplates. The PRRSV was inoculated at multiplicity of infection of 0.01 onto each cell monolayer. The plates with infected cell monolayers were incubated at 37℃ in an atmosphere of 5% CO_2. The medium was removed when the infected cell monolayers exhibited cytopathic effects. The infected cell monolayers were then fixed with cold ethanol. After ethanol fixation, the plates were washed twice with phosphate-buffered saline

(PBS, pH 7.2). Thirty $\mu\ell$ of diluted rabbit anti-swine IgG FITC conjugate(Sigma U.S.A) was added. The plate was then incubated again at 37℃ for 30 minutes and then washed with PBS. The plate was observed under a fluorescent microscope.

Results

Of 3,505 serum samples tested, 1,581 sera (45.1%) had PRRSV antibody. Of 208 farms tested, 188(90.4%) farms were seropositive for PRRSV antibody. The antibody positive rates in 1- to <20-day old pigs, 20- to <40-day old pigs, 40- to <60-day old pigs, 60- to <80-day old pigs, ≥80-day old pigs, were 20.6 %, 16.8%, 34.9%, 59.3% and 72.2%, respectively(Table 1). In the adult pigs, gilt had higher antibody positive rate(35.5%) than those of boar(30.6%) and sow(30.8%). The most pigs were infected with PRRSV at around 50 to 60-day old. The seroprevalence of antibody varied with age. The highest seroprevalence of PRRSV antibody was observed in the growing pigs at around 80-day old. In many farms, the infection of PRRSV was confined to grower or finisher. However, antibody was detected from all production phase in some farms.

Table 1. Seroprevalence of PRRSV anti-body in swine sera collected from 208 farms for the diagnosis of PRRS during the period of January to December 2000

Age	No of pigs tested	PRRSV antibody positive pigs	
		Number	%
1-<20 d*	436	90	20.6
20-<40 d	435	73	16.8
40-<60 d	298	104	34.9
60-<80 d	398	236	59.3
≥80 d	1,143	825	72.2
Boar	49	15	30.6
Gilt	169	60	35.5
Sow	577	178	30.8
Total	3,505	1,581	45.1

*day old

Discussion

The test results showed that the PRRSV infection spread widely in swine herds throughout the country. Low seroprevalence of PRRSV antibody in weaned pigs was thought to be a decrease of maternal antibodies. The majority of PRRSV infection was known to be defined to the grower/finisher herds at around 80-day old. This kind of infection pattern suggests that partial depopulation of the infected swine herds may be one of the measures to eradicate the PRRSV infection. Some swine farms with PRRSV infection in a farrow-to-finish herd need to take time until spreading of PRRSV stop spontaneously in breeding/gestation facility and confined to a certain production phase. High seroprevalence of PRRSV anti-body in boar, gilt and sow indicates that these pigs in the breeding farms are the major source of PRRSV infection, and also play an important role in spreading the PRRSV between fan mates or herds. To avoid introduction of the PRRSV into susceptible swine herds, isolation and acclimatization of incoming boars and gilts for a certain period of time before introducing into breeding herd was recommended.

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