Persistence of PRRSV in Nursery Pigs

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Summary and Implications

Porcine Reproductive and Respiratory Syndrome virus (PRRS)V is known to cause persistent infections in swine populations. We inoculated three week-old feeder pigs with PRRSV (ATCC VR-2332) then collected and analyzed biological samples to determine the pigs' infection status over time post-inoculation (PI). Infectious virus was detected in 100% of animals at 63 days post inoculation and 90% of animals were still carrying infectious virus at 105 days PI.

Introduction

Porcine Reproductive and Respiratory Syndrome virus remains one of the principal causes of respiratory disease and reproductive loss in commercial swine operations worldwide. The epidemiology of PRRSV is complicated by the fact that the infection produces carrier animals, i.e., clinically normal, but chronically infected animals that serve as potential sources of infection. The presence of carrier in endemically infected herds makes the control or elimination of PRRSV from commercial herds difficult.

The objective of this study was to characterize the proportion of PRRSV carriers in a population. The experiment was designed as a longitudinal study in which biological samples were collected from pigs over time post-inoculation and assayed for the presence of virus.

Materials and Methods

Three-week-old pigs (n=120) were obtained from a herd free of PRRSV and randomly assigned to one of two treatments: PRRSV inoculated (n=60) or uninoculated controls (n=60). Pigs exposed to PRRSV were intranasally inoculated with two milliters (1 ml./naris) of the North American isolate ATCC VR-2332 at a concentration of 10^3 fluorescence foci units per milliter (FFU/ml.).

Serum samples were collected from all pigs for virus isolation and/or serological evaluation on days –5, 0, 7, 14, 21 PI, and every 14 days thereafter or until animals were euthanized. Peripheral blood leukocytes were collected from all pigs on day 63 PI and every 14 days thereafter or until euthanasia. Twelve animals were euthanized from each group on days 63, 77, 91, 98, and 105 PI. Blood samples and oropharyngeal scrapings were collected ante mortem and tissue samples (lung, lung lavage, tonsil, tracheobronchial lymph nodes) were collected post mortem. All samples were appropriately processed, coded with random numbers, and stored at minus 80°C until tested.

Detection of infectious virus was required to classify animals as carriers. The carrier status of individual pigs was determined as follows: step 1, virus isolation (VI) was attempted on oropharyngeal scrapings; step 2, if oropharyngeal scrapings were VI negative, VI was performed on tissues; and step 3, if tissues were VI negative, swine bioassay was conducted using tonsil homogenate. Pigs were considered to be carriers if PRRSV was detected at step 1, 2, or 3.

Results and Discussion

Uninoculated control pigs remained uninfected and serologically negative throughout the study. All inoculated pigs were viremic at day 7 PI. Results of the assays indicated that 100% of inoculated pigs were carriers at 63 days PI. The rate of carrier animals declined slightly over time, but approximately 90% of pigs were still carriers at 105 days PI.

This is the first study to quantify the rate of PRRSV carriers in a defined population. These results raise important questions regarding the virology and immunology of the virus and have profound implications for the prevention and control of PRRS.