

Title: The pathogenesis and characterization of porcine epidemic diarrhea virus (PEDV) and porcine enteric deltacoronavirus (PdCV) in neonatal gnotobiotic (Gn) swine – **NPB #14-188**

Investigator: Dr. Michael Oglesbee, Ph.D., D.V.M. Professor

Institution: College of Veterinary Medicine, The Ohio State University

Date Submitted: 04/30/2015

Scientific Abstract:

Porcine epidemic diarrhea virus (PEDV) and porcine enteric deltacoronavirus (PdCV) are enteric coronaviruses and caused significant economic loss in the swine industry in the US. Currently, the pathogenesis of PEDV and PdCV in piglets was poorly understood and the minimum *in vivo* viral infectious doses for PEDV and PdCV are not known. Here, we characterized the pathogenesis of PEDV and PdCV Ohio strains and determined the minimal titratable infectious dose of PEDV and PdCV in gnotobiotic piglets. To do this, ten-fold dilutions (10^6 , 10^4 , 10^3 , 10^2 , 10^1 PFU) of PEDV and PdCV were performed and orally inoculated into each piglet in each group of 10-day-old gnotobiotic piglets (n=5). For PEDV, inoculation doses of 10^6 , 10^4 , 10^3 , and 10^2 PFU/piglet caused severe clinical signs including profuse watery diarrhea, vomiting, and dehydration. Histologically, severe villous atrophy of the duodenum, jejunum and ileum was observed in these groups. Immunohistochemical (IHC) analysis showed that a large number of PEDV antigens were found on the mucosal epithelia of intestinal tissues using polyclonal antisera raised against PEDV. In contrast, piglets inoculated with 10^1 PFU of PEDV caused no to mild clinical signs and histologic lesions in small intestine. We found for the first time that the PdCV US strains caused severe diarrhea, vomiting, and dehydration, clinically indistinguishable from PEDV. Histologically, the PdCV caused severe lesions in stomach and small intestine, and mild interstitial pneumonia in gnotobiotic piglets. For PdCV, doses above 10^3 PFU per piglets caused severe clinical signs and histologic lesions whereas no to mild lesions observed for piglets inoculated with 10^2 PFU of PdCV. Thus, under our experimental conditions, the minimal infectious dose for PEDV and PdCV in gnotobiotic piglets is 10^1 PFU and 10^2 PFU, respectively. The finding that low infectious particles were sufficient to cause an infection in piglets highlights the need to develop effective measures to ensure complete inactivation of PEDV and PdCV in farm and environment.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • pork.org
