AASV Proceedings

Defining PEDV maternal immunity and correlates of neonatal protection

K. Poonsuk, L. G. Gimenez-Lirola, W. Gonzalez, J. Zhang, Q. Chen, L. Correa da Silva Carrion, C. Olsen, R. Magtoto, J. Johnson, J. Zimmerman, K. J. Yoon
College of Veterinary Medicine, Iowa State University, Ames, Iowa

Introduction

The work described herein was conducted to evaluate maternal humoral immunity and lactogenic protection against PEDV in neonates. The objective was to (1) predict the levels of IgA in milk required to protect piglets against PEDV and (2) characterize the maternal antibody profile associated with protection in piglets.

Methods

Experiment 1: Piglets nursing PEDV-immune sows.

Two PEDV-naïve sows and 8 sows previously infected with PEDV via on-farm feedback and/or field exposure were acquired at ~100 days of gestation. After farrowing, piglets were orally inoculated with 1 x 103 TCID50 PEDV at 2 days of age and then monitored for 12 days. Piglets remained with their dams throughout the observation period. Sow monitoring included: serum samples 7 days pre-farrowing and 14 days post-farrowing, as well as daily clinical observations, colostrum/milk samples, and fecal samples. Piglet monitoring included: serum samples at 0 and 12 DPI, as well as daily clinical observations, body weight, body temperature, and fecal samples.

Experiment 2: Piglets with PEDV passive antibody but nursing PEDV-naïve sows.

Seven PEDV-naïve sows were acquired at ~100 days of gestation. At 2 days of age, piglets were intraperitoneally administered 1 of 6 levels of PEDV antibody. At 3 days of age, piglets were orally inoculated with 1 x 103 TCID50 PEDV and then monitored for 14 days. Piglets were administered 1 of 6 levels of passive anti-PEDV antibody 2 days after birth and subsequently inoculated with 103 TCID50 PEDV at 1 day after administration. Piglets remained with their dams throughout the 14 day observation period. Sow monitoring included: serum samples 7 days pre-farrowing and 16 days post-farrowing, as well as daily clinical observations, colostrum/milk samples, and fecal samples. Piglet monitoring included serum samples at -1, 0, and 14 DPI; as well as daily clinical observations, body weight, body temperature, and fecal samples.

Testing:

Serum and milk were tested for IgA and IgG by PEDV isotype specific ELISAs. In Experiment 1, fecal samples were pooled by litter and tested by PEDV real-time RT-PCR. In Experiment 2, fecal samples were tested individually by PEDV real-time RT-PCR.

Outcomes and Impact

Preliminary results showed that piglets receiving milk with higher IgA titers shed less PEDV in feces (P-value = 0.04) and had higher survival rates.

Editor's Comments: This study shows results that suggest both clinical evidence of lactogenic immunity as well as a reduction in the amount of PEDV shed by piglets with exposed dams compared to those with naïve dams. It is a great reiteration of the immunity suggested in another study recently published (Goede, 2015) that evaluated clinical and shedding differences between sows' litters that had been naïve and those that were exposed to S-INDEL variant PEDV months prior to the study's challenge infection with original US PEDV. This ISU study doesn't look at S-INDEL cross protection, but rather was able to determine that higher IgA titers in milk were associated with these effects seen in the previously exposed sows' litters.

Poonsuk, K. et al. (2015). Defining PEDV maternal immunity and correlates of neonatal protection. Proceedings of 2015 American Association of Swine Veterinarians Annual Meeting: Beyond Our Oath: Integrity, Intensity, Professionalism. Orlando, FL: American Association of Swine Veterinarians.

Goede D, Murtaugh M, Dvorak C, Nerem J, Yeske P, Morrison RB, Previous infection of sows with a "mild" strain of Porcine Epidemic Diarrhea Virus confers protection against infection with a "severe" strain, Veterinary Microbiology (2015), 10.1016/j.vetmic.2014.12.019.