RESEARCH ABSTRACT

SWINE HEALTH

Title: Pathogenicity and antibody responses of different U.S. PEDV strains in pigs of different ages **- #17-184- IPPA**

Investigator: Dr. Jianqiang Zhang

Institution: Iowa State University

Date Submitted: July 31, 2019

Scientific Abstract:
Currently, two main strains of porcine epidemic diarrhea virus (PEDV) i.e. U.S. prototype and S-INDEL PEDVs, circulate in U.S. swine but their pathogenicity and antibody responses in different ages of pigs have not been well characterized. This study aimed to compare pathogenicity and antibody responses of these two PEDVs in three ages of pigs. Thirty 3-week-old ("weaned"), thirty 8-week-old ("grower"), and thirty 23-week-old ("finisher") pigs were included with each age divided into 3 groups (10 pigs/group) and orogastrically inoculated with PEDV isolate USA/IN19338/2013 (prototype), USA/IL20697/2014 (S-INDEL), or virus-negative medium. Half the pigs in each group were randomly selected for necropsy at 4 DPI and remaining pigs were necropsied at 28 DPI. Virus load was determined by a quantitative PEDV N gene-based real-time RT-PCR. Five pigs in each group that went through 28 DPI were compared for antibody responses. Serum neutralizing antibody was measured by a fluorescent focus neutralization assay using prototype PEDV as the indicator virus. Serum IgG and oral fluid IgA antibodies were measured by PEDV fluorescent microsphere immunoassay (FMIA) based on the N-terminal portion (S1) of the prototype PEDV spike protein. In "weaned" pigs, prototype PEDV had longer duration of fecal shedding and significantly higher fecal and oral fluid virus loads than S-INDEL PEDV. In "grower" pigs, S-INDEL PEDV had longer fecal shedding than prototype PEDV; S-INDEL fecal virus load was significantly higher than prototype PEDV at 7 and 14 DPI but was opposite at 10 DPI. In "finisher" pigs, the onset of prototype PEDV fecal shedding was earlier and fecal virus load was higher than S-INDEL PEDV. For prototype PEDV, the onset of fecal virus shedding was earliest and shedding level was highest in "weaned", followed by "grower" and "finisher" pigs. S-INDEL PEDV trended similarly when compared across age groups. The data suggest that pathogenicity of PEDV is pig age-dependent (more severe in younger pigs) and virus strain-dependent. Prototype PEDV appeared to be more pathogenic than S-INDEL PEDV in "weaned" and "finisher" pigs, but pathogenicity difference of two viruses was less distinct in "grower" pigs. Neutralizing antibody, serum IgG and oral fluid IgA responses indicated that prototype PEDV induced greater antibody responses than S-INDEL PEDV in both "weaned" and "finisher" pigs, while the difference of antibody responses induced by two PEDV strains in "grower" pigs was not a clear cut and it depends on antibody assay. Prototype PEDV induced similar neutralizing antibody responses in three ages of pigs, stronger serum IgG responses in "weaned" pigs than in "grower" and "finisher" pigs, and stronger oral fluid IgA responses in "finisher" pigs than in "grower" and "weaned" pigs. Interestingly, S-INDEL PEDV appeared to consistently induce stronger antibody responses in "grower" pigs than in "weaned" and "finisher" pigs. In summary, this study suggests that pathogenicity and antibody response of PEDV is both virus strain-dependent and pig age dependent. The data provide some guidance on selecting appropriate PEDV strain to induce antibody response in different age of pigs.