

## **Pathogenesis comparison and cross-protection efficacy of the U.S. PEDV prototype and S-INDEL-variant strains in weaned pigs**

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### **Introduction**

Two strains (U.S. prototype [P] and S-INDEL-variant [V]) of PEDV are currently circulating in the U.S. Pathogenesis comparison of the two strains in 5-day-old pigs showed that the V-strain was less virulent than the P-strain. However, PEDV pathogenicity is age dependent. Also, understanding the cross-protection between two strains is imperative for PEDV vaccine development. In the current study, the pathogenesis difference and the cross-protection efficacy between the two U.S. PEDV strains were evaluated in weaned pigs.

### **Materials and Methods**

85 PEDV-naïve 3-week-old (3w) pigs were divided into 7 groups. Pigs were orogastrically inoculated with negative media (N), a P-strain isolate (P), or a V-strain isolate (V) at Day 0 (D0) followed by challenge at D28, with 10<sup>5</sup> TCID<sub>50</sub>/pig at each point. Seven groups were designated according to 1<sup>st</sup>/2<sup>nd</sup> inoculation: P/V (15 pigs), V/V (15 pigs), N/V (15 pigs), P/P (10 pigs), V/P (10 pigs), N/P (10 pigs), N/N (10 pigs). 5 pigs from the P/V, V/V, and N/V groups were necropsied at D4 and 5 pigs from all groups were necropsied at D34 to evaluate gross and microscopic lesions. The remaining 5 pigs/group were kept until D56 to evaluate virus shedding and antibody (Ab) responses by indirect fluorescent antibody (IFA) assay and virus neutralization (VN) test.

### **Results**

P-strain-inoculated 3w pigs shed more viruses in feces, and had more severe intestinal lesions at D4, than V-strain-inoculated 3w pigs. Interestingly, after the 2<sup>nd</sup> challenge at D28 (pigs 7w), the N/V group shed more viruses than the N/P group and had more severe lesions at D34 than the N/P group.

After the 1<sup>st</sup> inoculation, the P/P, P/V, V/V and V/P pigs started to develop PEDV Ab from D7-14; Ab titers increased slightly after the 2<sup>nd</sup> challenge and were maintained through D56. The N/P and N/V groups were PEDV Ab negative until D42 when Ab became detectable and were maintained through D56. The N/N group remained virus and Ab negative throughout the study. After the 2<sup>nd</sup> challenge, fecal viral shedding in the P/P, V/P, V/V, and P/V groups was all significantly lower than the N/V and N/P groups. Both P/V and V/V groups had fewer lesions than the N/V group at D34. Due to mild lesions in the N/P group at D34, distinct lesion differences among the N/P, V/P and P/P groups were not observed.

### **Conclusion**

1. P-strain was more virulent than V-strain in 3w pigs but opposite in 7w pigs under the conditions of this study.
2. P-strain immunization provided protection against P-strain challenge and cross protection against V-strain challenge.
3. V-strain immunization provided protection against V-strain challenge and partial cross protection against P-strain challenge.