10^7, 10^6, and 10^5 TCID50/g corresponding to a Ct of 27, 30, 33, and 37, respectively) and Ct increased linearly (P < 0.01, R^2 0.98) as PEDv dose decreased. Every 1 log reduction in PEDv concentration resulted in an increase in 3.4 ± 0.21 Ct in feed with detectable PEDv RNA. When the PEDv was added to the feed, an increase of 9.6 ± 0.4 SEM Ct was observed compared with the tissue culture PEDv concentration for those feed samples that had detectable PEDv RNA. When the supernatant was used to inoculate 10-d-old pigs, fecal sample Ct ranged from 16 to 27 on d 4 and 6 after inoculation for pigs inoculated with the 4 highest feed doses. No detectable PEDv RNA (Ct > 45) was noted in pigs inoculated with the other doses. Infection with PEDv was further confirmed in pigs from these 4 doses by histopathology and PEDv specific immunohistochemistry. In conclusion, these data suggest that PEDv infectivity was correlated with a positive feed PEDv PCR analysis. The minimum infective dose of PEDv in a feed matrix was demonstrated to be 5.6 x 10^4 TCID50/g and had an equivalent feed PCR Ct of 37. Overall, these data confirm that feed can be a vehicle for PEDv transfer and that a Ct of 37 can lead to infectivity in 10-d-old pigs.

Key Words: bioassay, feed, minimum infectious dose, Porcine epidemic diarrhea virus


E. J. Neumann1, M. A. Ackerman2, C. Troxel3, R. L. Moser3*, 1Epi-Insight Limited, Palmerston North, New Zealand, 2Swine Veterinary Services PC, Greensburg, IN, 3JBS United, Inc., Sheridan, IN.

Porcine epidemic diarrhea virus (PEDv) is a virus in the family Coronaviridae, confirmed for the first time in the United States on May 16, 2013. An investigation of the Canadian outbreak by the Canadian government identified an empirical association between feeding porcine blood plasma (subsequently found to be PCR positive for PEDv genetic material) and occurrence of the disease. To investigate the association between exposure to porcine-origin feed ingredients and the occurrence of PEDv, an epidemiological investigation of midwestern U.S. pork farms was undertaken in May 2014. Feed delivery data related to pig farming clients confirmed as being infected with PEDv were obtained from a commercial feed manufacturer’s information system. All deliveries of feed in the 2 wk prior to each PEDv outbreak that contained either spray dried plasma protein (SDPP), granulated red-blood cells (SDBC), choice white grease (CWG), or hydrolyzed porcine proteins (HPEP) were identified. The batching number for each feed delivery was then back-traced through the feed manufacturer’s information system to identify the lot-level detail for each of the ingredients listed above that were included in the deliveries. This list of risk-associated lot numbers was then forward-traced to identify the complete list of clients to whom feed deliveries were made that included these same ingredient lot numbers but were not infected with PEDv (control farms). The risk of PEDv that was associated with exposure to specific lots of porcine-origin feed ingredients was then determined by estimating the odd’s ratio (OR) for each ingredient (at both the ingredient-level and the lot-level). Forty-three cases and 418 controls were included in the study, with the most important limiting factor being the availability of ingredient data at the lot-level. Two sources of SDPP (5 and 6 lots, respectively), and 1 source each of SDBC (3 lots), CWG (10 lots), and HPEP (1 lot) were included in the analysis of risk. No ingredients were positively associated (OR > 1 and P < 0.05) with PEDv.