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The Correlation between Sows and Their Piglets Relating to Immunity Against the Porcine Epidemic Diarrhea Virus

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Introduction: Porcine Epidemic Diarrhea (PED) is caused by PED virus (PEDV) that is a member of the order *Nidovirales*, family *Coronaviridae* and genus *Coronavirus*. PED is a severe enteric disease that causes economic losses worldwide. Maternal passive immunity can prevent losses in suckling piglets during the period of immature immune system. Sow colostrum is the most abundant and easily accessible resource of a farm. The aim of this study was to evaluate an immunological correlation between sow and their offspring.
Materials and Methods: Forty three sows within parities 1, 3 and 5 were selected from 4 different Thai pig farms; a PEDV free farm (A), a farm which was previously infected with PEDV and PED vaccination was applied in sows (B) and two farms which were previously infected with PEDV and feedback technique for PEDV was applied in sows at 4 weeks before farrowing (C and D). Blood and colostrum samples were collected from these sows at parturition as well as blood samples of their piglets at 5 days old. Sow's blood samples were collected from jugular veins whereas colostrum samples were collected from the first teat within 30 min post-parturition. All samples were analysed for specific PED immunoglobulin A (IgA) and immunoglobulin G (IgG) using an in-house PED ELISA test kit which was developed by the Diagnostic Unit, Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen campus, Thailand. The data was analysed the immunity correlation by using statistical R-program.
Results: For farm A, very low S/P ratios (negative results) of both IgG and IgA in sow's colostrum and serum were detected. The S/P ratios of IgG in serum and colostrum in vaccinated herd were higher than those in feedback herds. On the other hand, feedback herds had higher S/P ratios of IgA in serum and colostrum. As a result, the S/P ratios of IgG and IgA between sow serum and colostrum showed a positive correlation (r=0.75 and 0.61, respectively). In addition, sow colostrum IgA showed S/P ratio approximately 1.5-2.0 times more than S/P ratio of piglet's serum IgA at 5 days old. The S/P ratios of IgG and IgA in sow's colostrum were found to have a positive correlation to those in piglet's serum (r= 0.72 and 0.71, respectively).
Conclusion: The in-house PED ELISA test kit can be applied to check IgA and IgG in serum and colostrum. The feedback technique induces the higher level of IgA in colostrum. Piglets from sows with high PED immunity in colostrum also have high PED titer in serum. In conclusion, endemically PED-infected farms must immunize with a suitable technique for a high level of immunity against PEDV and they should focus on piglet colostrum intake management.

Disclosure of Interest: None Declared

Keywords: Correlation, PEDv, pig immunity

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Different capabilities of five ELISAs for detection of antibodies against PEDV in pigs exposed to geographically different strains

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Introduction: Recently, PEDV has caused severe economic losses to the swine industries in the Americas and Asia and has now also been reported in Europe. Reliable serological assays are essential for epidemiological studies and vaccine evaluation. It has been suggested that ELISAs based on the whole virus (WV) antigen or the nucleocapsid protein (NP) would be more sensitive for detection of antibodies against heterologous PEDV strains than ELISA based on the spike 1 (S1) protein. The objective of this study was to assess the diagnostic performance of a commercial and four *in-house* ELISAs based on PEDV the WV, the NP protein or the S1 protein.
Materials and Methods: A total of 733 serum samples from North American or European pigs with known (n=380) or unknown (n=353) PEDV exposure status were tested with each of three indirect ELISAs (NP1-I, NP2-I, S1-I), a blocking ELISA (WV-B) and a competitive (NP-C) ELISA. Specifically, 86 samples were obtained from pigs experimentally infected with genogroup 1 (G1), experimentally infected with genogroup 2 US prototype (G2) or S INDEL (G2-INDEL), or sham infected. Additional 149 samples from farms exposed to PEDV and 100 samples from farms with no exposure to PEDV were obtained from Italy. Furthermore, 45 samples positive to transmissible gastroenteritis virus (TGEV) or porcine respiratory virus (PRCV) were used. Finally, 353 porcine serum samples with unknown PEDV exposure status originating from the US or from Italy were also included.
Results: Overall, all five evaluated tests had a moderate agreement ($\kappa = 0.61$). All assays correctly identified pigs infected with G1, G2 or G2-INDEL. G1 infected pigs were earliest detected by the S1-I ELISA, G2-INDEL infected pigs were earliest detected by the WV-B ELISA and the NP-C ELISA, and the performance of all tests was similar for the G2 group. The WV-B ELISA presented the overall highest number of positive samples (48%, 315/647) and the NP1-I ELISA and NP-C ELISA presented the lowest detection rates (175 and 179/647, respectively) (p <0.01). WV-B and NP1-I ELISAs detected 2/21 and 1/21 TGEV antisera respectively, and NP1-I detected an additional 1/24 PRCV antisera.
Conclusion: The NP1-I had the overall lowest detection rates from sample subsets derived from both experimentally and naturally infected animals. The WV-B had the overall highest detection rates. Differences in detection rates among assays seem to be more related to intrinsic factors of an assay than to the PEDV antigen used. The decision which assay should be used for PEDV antibodies monitoring at the herd level ultimately needs to be based on desired specificity and sensitivity levels, easiness of testing, and access to a certain assay.

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Keywords: Antibodies, Diagnostic test, PEDv