RESEARCH ABSTRACT

SWINE HEALTH

Title: Comparison of PCR and serological assays for reliable, early and fast detection of PRRSV in boar studs – **NPB #11-058**

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Scientific Abstract

The high economic impact of porcine reproductive and respiratory syndrome virus (PRRSV) dictates the need for rapid and accurate diagnosis. The high mutation rate, rapid evolution and genetic variability of PRRSV strains complicate the development of long term reliable diagnostic assays, and consequently cases of false-negative results with commercially available assays have been reported. The objectives of this project were (1) to compare sensitivity, specificity, and time until completion of three different commercially available real-time RT PCR assays on different individual (serum, semen, blood swabs, oral fluids) or pooled sample types (serum, blood swabs) collected from boars experimentally infected with 1 of 6 diverse PRRSV isolates and (2) to compare commercial antibody detection systems for early detection of PRRSV antibodies in oral fluids and serum. Six groups of 3 boars negative for PRRSV were each inoculated with one of five PRRSV isolates (sharing 55-99% nucleotide sequence identity in ORF5). Samples were collected on days post-inoculation (dpi) -2, 1, 3, 5, 7, 14 and 21 and tested by one of three commercially available real-time RT-PCR assays: TaqMan® NA and EU PRRSV Reagents (AB, Applied Biosystems); Tetracore U.S. and Euro PRRSV Master Mix (TC, Tetracore) and the AcuPig® PRRSV real time PCR (AD, AnDiaTec GmbH). At dpi 1, all RT-PCR assays detected at least one positive sample in each group. The highest detection rates were on dpi 3 and dpi 5. Between dpi 1 and 7, serum samples had the highest detection rate (90%) with 100% agreement between tests, followed by blood swabs (Kappa = 0.97) and semen (Kappa = 0.80). Oral fluids had the lowest detection rates (AB: 55%; TC: 41%; AD: 46%) and the highest disagreement between kits (Kappa = 0.63). Pools of five samples did not reduce the detection rates if there was one high positive sample of viral RNA in the pool. Serum and blood swab samples had shorter turn-around times for RNA extraction. The AB assay had a 1.6 times shorter PCR reaction time. Serum and oral fluid samples were also tested by ELISA HerdChek PRRS X3 (E1, IDEXX laboratories), and serum samples were tested by CIVTESTsuis A/S (E2, for detection of PRRSV Type 1) and CIVTESTsuis E/S (E3 for detection of PRRSV Type 2, Laboratorios Hipra, Amer, Spain). Among serum samples, E1 were more specific and sensitive than E2 or E3. At dpi 7, 33% (5/15) pigs were positive by E1 versus none by E2 or E3. At dpi 14 and 21 all animals had detectable anti-PRRSV antibodies with E1. The E2 assay (used to detect anti-PRRSV Type II antibodies, groups 1-4) detected 1/12 false-positive samples on dpi -2. Six of 12 (50%) and 10/12 (83%) animals were positive on dpi 14 or 21. The E3 assay (used to detect anti-PRRSV Type I antibodies, group 5) had negative results throughout the experiment. From the 204 field serum samples tested, 2 (1%) tested positive using E1, 5 (2%) with E2, and none with E3. At dpi 7, 8 of 15 (53%) oral fluid samples were positive by E1, which was higher than the detection rate in serum samples.