Emergence of porcine reproductive and respiratory syndrome virus deletion mutants: Correlation with the porcine antibody response to a hypervariable site in the ORF 3 structural glycoprotein

By using porcine immune sera to select a library of phage-displayed random peptides, we identified an antigenic sequence (RKASLSTS) in the C-terminus of the ORF 3 structural glycoprotein of European-type porcine reproductive and respiratory syndrome virus (PRRSV). Through the use of overlapping reading frames, the same PRRSV genetic locus codes for the ORF 3 "RKASLSTS" sequence, and a previously described ORF 4 epitope (Meulenherg, J. J. M., Van Nieuwstadt, A. P., Van Essen-Zandbergen, A., and Langeveld, J. P. M., 1997, J. Virol. 71, 6061-6067). Sequence analysis identified naturally occurring deletion mutants at this ORF 3/4 site. Phylogenetic analysis showed the presence of a highly accurate ORF 3 molecular clock, according to which deletion mutants and nondeleted viruses evolved at differing speeds. Furthermore, deletion mutants and nondeleted viruses evolved as separate lineages. These distinctions suggested that deletion mutants were a hitherto unrecognized subtype of European-type PRRSV. Currently, deletion mutants appear to be outcompeting nondeleted viruses in the field, highlighting the importance of the porcine antibody response against the minor structural glycoproteins of European-type PRRSV for viral evolution.

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