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Development of a Reverse-Genetic Platform for Adapting Field Isolates of Porcine Arterivirus as Vaccine Backbones to Enhance Efficacy and Safety

Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) is a major pathogen in the swine industry, causing substantial global economic losses. Current vaccines exhibit limited efficacy, underscoring the need for innovative strategies to combat PRRSV. This study explores the infectivity and virulence of PRRSV to support vaccine development using a reverse-genetic platform based on Infectious Subgenomic Amplicons (ISA). The ISA method involves transfecting cells with overlapping DNA fragments, enabling viral RNA synthesis and facilitating the recovery and manipulation of PRRSV strains. Rescued viruses were characterized in cell culture systems to assess their biological properties, including infectivity and pathogenicity. These findings provide critical insights for designing targeted vaccines with enhanced efficacy and safety. The ISA platform demonstrates significant potential as a tool for advancing PRRSV research and vaccine development, offering promising strategies to mitigate the virus's impact on swine health and industry productivity.