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Previous work in cattle illustrated the protective efficacy and negative marker potential of a A serotype foot-and-mouth disease virus (FMDV) vaccine prepared from a virus lacking a significant portion of the VP1 G-H loop (termed A(−)). Since this deletion also includes the arginine-glycine-aspartate (RGD) motif required for virus attachment to the host cell in vivo, it was hypothesised that this virus would be attenuated in naturally susceptible animals. The A(−) virus was passaged three times in cattle via needle inoculation of virus suspension delivered into the intradermal space of the tongue (intradermolingual: IDL). Included in the study were three direct contact cattle, two of which were used for the third cattle passage (by inoculation) after direct contact exposure for three days. Cattle were monitored for clinical signs and samples were collected for sequencing as well as antibody and viral genome detection by ELISA and qRT-PCR. Following needle inoculation with the A(−) virus, naïve cattle developed typical clinical signs of FMDV infection, diagnostic assays also provided positive serological and virological results. However, the contact cattle did not develop clinical signs or generate serological or virological markers indicative of FMDV infection even when the cattle were subsequently needle inoculated with 105 TCID50 A(−) FMDV delivered IDL following three days of direct contact exposure. The results suggest that the A(−) virus is not attenuated in cattle when inoculated IDL. This virus could be useful as a tool to understand further the natural pathogenesis, receptor usage and internalisation pathways of FMDV.