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An improved reverse transcription loop-mediated isothermal amplification assay for sensitive and specific detection of serotype O foot-and-mouth disease virus

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Highlights

- A swarm primer-applied RT-LAMP assay was developed for the detection of serotype O FMDV.
- The assay was 10 times more sensitive than RT-PCR and comparable to the sensitivity of qRT-PCR.
- The swarm primer RT-LAMP assay showed 100% agreement with conventional RT-PCR.

Abstract

A sensitive and specific swarm primer-based reverse transcription loop-mediated isothermal amplification (sRT-LAMP) assay for the detection of serotype O foot-and-mouth disease virus (FMDV) was developed and evaluated. The assay specifically amplified the *VP3* gene of serotype O FMDV, but did not amplify the *VP3* gene of other serotype FMDVs or any other viruses. The limit of detection of the assay was 10^2 $TCID_{50}$/mL or 10^3 RNA copies/μL, which is 100 times lower than that of the RT-LAMP assay without swarm primers. The new assay is 10 times more sensitive than reverse transcription-polymerase chain reaction (RT-PCR) and is comparable to the sensitivity of real time RT-PCR (qRT-PCR). Evaluation of the assay using different serotypes of FMDV strains showed 100% agreement with the RT-PCR results. The previously reported serotype O FMDV-specific RT-LAMP assay did not detect 20 out of 22 strains of serotype O FMDVs, probably due to multiple mismatches between the primer and template sequences,