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LSDV100 and LSDV101 lumpy skin disease virus-specific PCR and real-time PCR for rapid diagnosis and vaccine quality control

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Capripoxviruses are genetically and antigenically similar. Sheeppox virus (SPPV) and goatpox virus (GPV) cause diseases in ovines and caprines, respectively. Lumpy skin disease virus (LSDV) causes lumpy skin disease (LSD) in cattle. LSD is endemic in Africa and the Middle East, and was recently introduced into Europe and Russia. Live attenuated SPPV is used as a vaccine in endemic areas. Cattle vaccinated using SPPV can develop LSD due to induction of partial protection, or as a result of vaccine seed contamination with non-highly-attenuated LSDV. LSD control and vaccine production can be enhanced by differentiation between LSDV and SPPV using a highly specific, simple, rapid, and inexpensive PCR assay. In this study, primers were designed to specifically amplify conserved LSDV sequences spanning parts of LSDV100, and LSDV101 genes. The design allowed the amplification of a 503 bp PCR product that was used for diagnosis. An alternative reverse primer allowed the amplification of a LSDV-specific 1583 bp PCR product for sequencing. The diagnostic assay detection limit was 585 genome-copy-equivalents of LSDV/5 ul of extract. A real-time assay was 10 times more sensitive. LSDV DNA was detected in skin samples collected from 1988 to 2015. Amplification of LSDV sequences was not affected by lesion size and distribution (localized or generalized) on infected animals. Application of the developed assay for the quality control of local LSD vaccines resulted in the detection of LSDV contamination of a local SPPV vaccine. The incorporation of the developed assay in LSD control programs was recommended.

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