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**A serological assay for differentiating Rift Valley Fever (RVF) naturally infected animals from arMP12  $\Delta$  Nsm del vaccinated animals**

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Rift Valley fever virus (RVFV) is the cause of Rift Valley fever (RVF), a significant public health and veterinary problem in Africa and the Arabian Peninsula. An effective vaccine is needed to prevent RVF in livestock, preferably a vaccine with a biomarker to distinguish naturally (virulent) infected from vaccinated animals (DIVA). Therefore, the goal of this study is to evaluate a live attenuated recombinant RVFV vaccine with deleted the non-structural nucleotides deleted from the M RNA segment (NSm) to serve as a biomarker to distinguish RVF vaccinated from animals infected with virulent RVFV. An indirect ELISA was developed using NSm protein as a capture antigen for detecting NSm-antibody in samples from naturally infected and for possible non-detection of NSm antibody in animals vaccinated with the NSm genes deleted RVF vaccine arMP-12 $\Delta$ NSm21/384. Sera samples from animals previously infected with virulent RVFV were obtained from Kenya and Tanzania, and from experimental challenge study in Canada. Also, samples from animals vaccinated with parent RVF MP-12 and the arMP-12 $\Delta$ NSm21/384 vaccine were obtained from virology laboratory at Sokoine University of Agriculture. All sera from animals infected naturally with virulent RVFV or from the challenge study had a geometric mean optical density (OD) reading of 0.88, thus demonstrating that animals were infected with virus containing the NSm antigen induced a detectable antibody response to this antigen. In contrast, animals vaccinated with RVF arMP-12 $\Delta$ NSm21/384 had an OD reading of only 0.17, or negative for antibody, thus demonstrating that animals vaccinated with RVF arMP-12 $\Delta$ NSm21/384 can be distinguished from animals infected with virulent RVFV.

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