Seroprevalence and factors associated with seropositivity to Rift Valley fever virus in livestock

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Objective

The objective of this study was to estimate the prevalence of antibodies to RVFV in domestic cattle, sheep, and goats in a study area in the central interior of South Africa, and to identify factors associated with seropositivity.

Introduction

Rift Valley fever (RVF) is a mosquito-borne viral zoonosis. This study aimed to estimate the prevalence of antibodies to RVF virus (RVFV) in cattle, sheep, and goats in South Africa, near the 2010-2011 outbreak epicenter and identify factors associated with seropositivity.

Methods

A cross-sectional study was conducted during 2015-2016 within a ~40,000 km^2 region between Bloemfontein and Kimberley. Farms were selected using random geographic points with probability proportional to the density of livestock-owning households. Livestock were randomly sampled from the farm closest to each selected point. A questionnaire was used to collect information concerning animal, management, and environmental factors. Sera samples were screened for RVFV antibodies using IgG inhibition ELISA. Data were analyzed using multilevel logistic regression models.

Results

On 234 farms, 3,049 animals (977 cattle, 1,549 sheep and 523 goats) were sampled. Estimated RVF seroprevalence, adjusted for clustering and sampling weights, was 42.9% (95% CI: 35.7-50.4%) in cattle, 28.0% (95% CI: 21.3-35.4%) in sheep and 9.3% (95% CI: 5.8-13.9%) in goats. Compared to animals <2y of age, seroprevalence was higher in animals 2-4y (OR=2.8, P<0.001) and >4y old (OR=17.0, P<0.001). Seroprevalence was also higher on private vs. communal land (OR=4.3, P=0.001) and was positively associated with the presence of perennial rivers (OR=1.6, P=0.03) and seasonal pans (OR=1.8, P=0.005) on the farm. The odds of seropositivity was higher in domestic ruminants recently vaccinated between 2014-2015 (OR=2.1, P=0.007) compared to those never vaccinated.

Conclusions

The presence of IgG antibody against RVFV among domestic ruminants, born after the most recent outbreak (<4y category), and association with known RVF risk factors, indicates the possibility that viral circulation has occurred during the inter-epidemic period.

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