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Quantitative risk assessment for African horse sickness in live horses exported from South Africa

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Purpose

African horse sickness (AHS) is a severe arboviral infection of equids, spread by *Culicoides* spp. vectors and causing up to 95% case fatality rates in susceptible horses. AHS is endemic in South Africa. Since 1997, live horses have been exported through a vector-protected quarantine facility in a small free zone in Cape Town. Periodic AHS outbreaks have disrupted trade, so that exports were only possible about 50% of the time between 1997 and 2014. This study was undertaken to evaluate risk management options to allow safe export of horses from South Africa on a regular and ongoing basis.

Methods

A stochastic simulation model was developed to estimate the probability of an undetected AHS-infected horse being exported from South Africa, under a variety of scenarios. Six scenarios were simulated for horses exported from a biosecure, vector-protected facility in either a low-risk area, with additional risk management, or from an endemically infected area, with varying numbers of PCR tests during pre-export or post-arrival quarantine. Inputs to the model included estimated incidence in the source area, probabilities of breakdown of vector protection during quarantine and loading and the probability of detecting midges if a breakdown of vector protection occurs. Results are presented as probability distributions of the expected number of horses and shipments per undetected infected horse being exported.

Results

The median probability of an exported horse being infected and undetected from the low risk area was 9.1 x 10^-6 (0.00091%) and 97.5 percentile of 7.8 x 10^-5 (0.0078%), assuming a single PCR test in pre-export quarantine. The expected number of shipments per undetected, infected horse exported was 3 434 (2.5 percentile: 398 shipments), increasing more than 10-fold for each additional PCR test applied. The probability of exporting an undetected infected horse from the endemic area was between 10 and 20-fold that of exports from the low-risk area for otherwise similar scenarios.

Conclusions

These results show that, with appropriate risk mitigation measures, the export of horses from South Africa is possible with negligible risk of exporting an undetected infected animal.