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Main topic : One Health

A new pen-side test to confirm RVF clinical suspicions in the field.

DONNET F. [1], PEDARRIEU A. [2], LIMOZIN A. [1], COMTET L. [1], CETRE SOSSAH C. [2], POURQUIER P. [1]

[1] Innovative Diagnostics, Grabels, France; [2] CIRAD, INRAE, UMR ASTRE, University of Montpellier, Montpellier, France

Introduction:
Rift Valley fever (RVF) is a zoonotic disease causing an acute infection in domestic ruminants, with a high mortality rate among young animals. IDvet developed a multispecies cELISA for the detection of RVFV specific antibodies, and ruminant RVFV specific IgM antibodies. Fast and reliable tools are needed to rapidly diagnose suspected clinical cases.

Diagnostic performances of a new pen-side test to detect RVFV in less than 15 minutes: the ID Rapid® Rift Valley fever are presented here.

Materials and methods:
The test is based on biological materials raised at CIRAD (Cêtre-Sossah C. et al., 2019). Anti-RVFV nucleocapsid-specific antibodies are bound to colloid gold particles or immobilized onto the membrane test line. A control line validates the migration. The kit contains a migration buffer dropper and micropipettes for sample transfer (15 µl serum, 30 µl blood).

Diagnostic specificity was assessed by testing 580 negative sera (292 cattle, 96 small ruminants and 192 camelids) and 184 heparinized whole blood (cattle) from RVF free areas.

Analytical sensitivity was evaluated using a titrated RVFV strain (Smithburn) spiked in negative whole blood or serum (bovine and caprine).

Results:
Measured specificity on serum was 99.7% (98.1 – 99.9%) for cattle, 99.0% (94.3 – 99.1%) for small ruminants and 100% (98.0 – 100%) for camelids ; on bovine whole blood was 98.9% (96.1% – 99.7%).

For this Mab pair, inclusivity had been previously assessed using different RVFV viral strains, all successfully detected, indicating 100% inclusivity. Exclusivity with flaviviruses and alphaviruses were also documented, excluding possible cross-reactivity with other viral genera with same clinical features. The limit of detection (LOD) was 3.5x103 pfu for serum, and 7.5 x104 pfu for whole blood. Diagnostic sensitivity on serum of a previous similar test having the same LOD was previously assessed by testing 25 isolated strains of from different geographical origins mimicking clinical specimens and 10 clinical samples from the 2019 Mayotte outbreak, which were positive by RTqPCR (Bird et al., 2007). Diagnostic sensitivity was 100% (CI95%: 90,1 – 100 n = 35).

Conclusion:
The ID Rapid® Rift Valley fever antigen demonstrates very high levels of specificity and inclusivity, and a sensitivity level adapted to a specific, accurate and rapid detection of RVFV in serum or whole blood. It is a reliable tool able to confirm a RVF clinical suspicion and enhance virus detection during an outbreak in less than 15 minutes directly on the field, without any specific lab equiment.