Investigating the domestic pig (*Sus scrofa domesticus*) as a potential model to study Rift valley fever

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Introduction

Rift valley fever (RVF) is a vector-borne zoonotic disease of domestic ruminants mainly, caused by RVF virus (RVFV). Animals experience widespread abortions and neonatal, deaths, while humans develop flu-like symptoms that can increase in severity (Ikegami & Makino; 2011). Animal models to study zoonotic infectious diseases should reproduce various aspects of the diseases. Domestic pigs are closely related to humans genetically, anatomically and physiologically (Meurens *et al*., 2012), and are increasingly being used to study various infectious diseases. The appropriateness of pigs for use in RVF biomedical research is unknown since their susceptibility to RVFV and infection dynamics were not fully investigated.

Project objectives

To determine:

i). A suitable route to infect pigs with RVFV

ii). A suitable serological assay to test pig sera for anti-RVFV antibodies

iii). Susceptibility of pigs of 3 different age groups to RVFV infection *i.e* pregnant sows (n = 9), weaners (n = 18) and suckling piglets (n = 20)

Milestones/achievements

Results proved that:

i). Domestic pigs can be successfully infected with RVFV intravenously, as evidenced by seroconversion and presence of viral RNA in blood, tissues, and oronasofaecal secretions (Fig. 1)

ii). The commonly used IDVET RVFV blocking antibody ELISA is less sensitive than the VNT when testing porcine sera. Validation of the assay should be performed when used in species other than domestic ruminants to avoid false negative results (Fig. 2)

iii). Sows can abort following infection with high doses of RVFV and precautions should be applied when assisting aborting sows amid RVF outbreaks (Fig. 3)

iv). Weaners and suckling piglets can be sub-clinically infected with RVFV and weaners can potentially shed virus in oronasofaecal excretions for 1 month post infection

Conclusions

Domestic pigs are susceptible to experimental RVFV infection, *albeit* subclinically. Research into a pig's immune response to RVFV infection could contribute to the development of effective RVF vaccines that have application in both animals and humans, since the porcine immune system more closely resembles that of humans for >80% of analysed parameters compared to mice at 10% (Meurens et al., 2012).

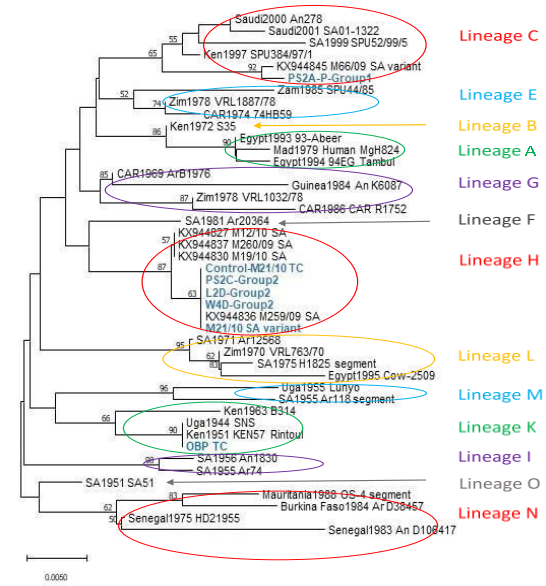

Fig. 1 Neighbour joining tree showing clustering of RVFV present in tissue pools of infected pigs, with parent viruses, confirming infection

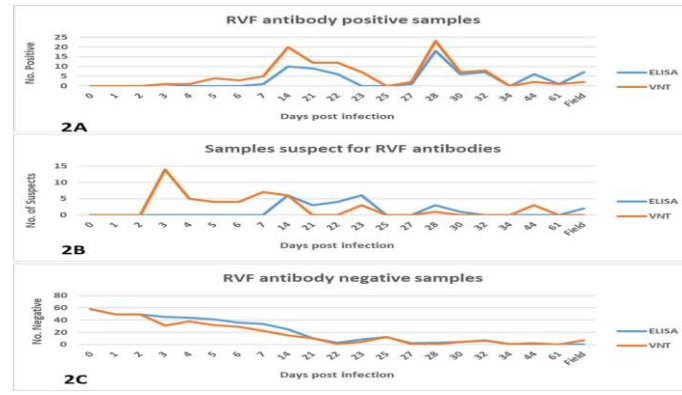

Fig. 2 Comparison of the number of RVFV antibody positive (2A), suspect (2B) and negative (2C) results obtained using IDVET Blocking ELISA and VNT

Fig. 3 Pig foetuses aborted 10 days before the dam's expected farrowing date. The sow was infected with 5X107 pfu/ml of RVFV intravenously

Future Plans

i). Investigate a suitable route of RVFV infection in domestic pigs that would mimic natural infection

ii). Validate and optimize commercially available RVF Blocking antibody ELISAs for use in domestic pig samples

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