Persistent Infection with Foot and Mouth Disease in Asian Swamp Buffalo (ASB) in South East Asia (SEA)

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Objectives

➢ To assess
  • seropositive of FMDV infection in swamp buffalo in South East Asia (SEA)
  • the prevalence of FMDV carriers in Asian swamp buffalos

➢ To determine
  • duration of persistence of FMDV in buffalo
  • the possibility of transmission of FMDV from carrier buffalo to naïve

➢ To validate
  • different NSP antibody tests for buffalo samples
  • salivary IgA assay for detection of carrier for swamp buffalo.
Study Sites
The Study:

- Three longitudinal studies with field sample collections at 6 monthly intervals
- Five hundred (500) ASB were randomly selected from specific areas in Lao PDR and Myanmar that had confirmed FMD outbreaks.
Sample collections
Sample Processing

Myanmar FMD lab.

IAH lab.

Lao PDR FMD lab.
Laboratory tests

- Virus Isolation
- Serology
- Real time PCR
Characterisation of test performances by Bayesian framework in buffalo population in SEA

<table>
<thead>
<tr>
<th>Test</th>
<th>Se [95% BPI]</th>
<th>Sp [95% BPI]</th>
<th>PPV [95% BPI]</th>
<th>NPV [95% BPI]</th>
<th>LR+ [95% BPI]</th>
<th>LR- [95% BPI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PrioCHECK</td>
<td>0.803 [0.797-0.811]</td>
<td>0.995 [0.987-1]</td>
<td>99.65% [99.18%-100%]</td>
<td>72.64% [71.32%-74.28%]</td>
<td>9175.5 [63.68-3988]</td>
<td>0.1981 [0.1833-0.1997]</td>
</tr>
<tr>
<td>3ABCItaly</td>
<td>0.811 [0.798-0.839]</td>
<td>0.994 [0.987-1]</td>
<td>99.61% [99.19%-99.99%]</td>
<td>72.53% [70.11%-76.48%]</td>
<td>747.4 [63.21-2889]</td>
<td>0.1907 [0.1610-2019]</td>
</tr>
<tr>
<td>UBI</td>
<td>0.674 [0.673-0.679]</td>
<td>0.997 [0.990-1]</td>
<td>99.67% [99.13%-100%]</td>
<td>62.03% [61.52%-62.41%]</td>
<td>2047 [60.72-8660]</td>
<td>0.3266 [0.322-0.330]</td>
</tr>
<tr>
<td>Chekt</td>
<td>0.608 [0.524-0.716]</td>
<td>0.979 [0.960-0.999]</td>
<td>98.91% [97.39%-99.95%]</td>
<td>44.43% [7.780%-64.03%]</td>
<td>160.5 [14.34-574.6]</td>
<td>0.4001 [0.2882-0.4879]</td>
</tr>
<tr>
<td>IgA</td>
<td>0.800 [0.797-0.806]</td>
<td>0.996 [0.988-1]</td>
<td>99.74% [99.22%-100%]</td>
<td>72.57% [71.58%-73.27%]</td>
<td>5344 [68.21-6970]</td>
<td>0.2011 [0.1945-0.2044]</td>
</tr>
<tr>
<td>PrioCHECK + IgA</td>
<td>0.983 [0.894-0.999]</td>
<td>0.993 [0.987-0.999]</td>
<td>99.68% [99.36%-99.99%]</td>
<td>96.33% [76.13%-99.99%]</td>
<td>1707 [76.32-2953]</td>
<td>0.017 [0.0.1072]</td>
</tr>
</tbody>
</table>
Performance results of the different tests used

- VI and real time RT-PCR was validated using 101 OP fluid samples collected at 8 months PI.
  - 14% of the 101 ASB were + by VI 8 months PI
  - 10% of the 101 ASB were + by real time RT-PCR

- To maximize detection and to address specificity issue a strategy of combining 2 independent tests (NSP+IgA ELISAs) was made.
  - Results showed a higher detection rate (32.7%) compared to VI and real time RT-PCR.
Phylogenetic tree based on capsid sequences of FMDV showing relationships between Lao PDR serotype A FMDV isolates and other type A representatives in the world. Viruses from the FMD carriers in ASB are highlighted by the blue circles.
Phylogenetic tree based on capsid sequences of FMDV showing relationships between Myanmar serotype O FMDV isolates and other type O representatives worldwide. Viruses from the FMD carrier in ASB are highlighted inside the green circle.
Results Summary

• The study confirmed that ASB may become persistently infected with FMDV and carry the virus at least up to 20 months (end of the study) after the infection.

• ASB may possibly present a true reservoir of infection of mixed viruses.

• Several seronegative animals for FMDV in the 1st study were detected as positive in the subsequent studies which further supports that there maybe transmission of virus from these carrier animals in sub-clinical level.

• NSPELISA detect FMDV infection whereas salivary IgA ELISA detect FMD carrier animals in ASB.
A follow up study is needed to;

- To understand the mechanisms and the epidemiological significance of carriers in the maintenance and transmission of FMD in SEA

- This will require a more comprehensive and controlled studies
  - To clarify the mechanism for the establishment of carriers
  - Factors influencing transmission
  - Demonstrate the rates of transmission from FMD carrier ASB.
Acknowledgement
Thank you for your attention..