Understanding FMDV transmission to and from vaccinated animals – preliminary results.

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Objectives

- To broaden our understanding of FMDV transmission to and from vaccinated cattle
- To demonstrate effectiveness of ‘predictors of infectiousness’ established previously
- To determine inhibition of transmission after vaccination
- To quantify mean variance of infectiousness of partially protected animals
- Provide data for mathematical models.

Materials and Methods

A study was designed (diagram 1) in which 4 cattle were inoculated intradermolingually with FMDV O UKG 34/2001. These ‘inoculates’ were used 48 hrs later to challenge ‘donor’ cattle on a one to one basis by direct contact for 24 hrs. The ‘donor’ animals were then used to challenge vaccinated (day 0) and non-vaccinated recipients, by direct contact for 8 hrs. Challenge commenced when the donor first demonstrated a vesicle on the tongue, in the oral cavity or nose (predictors of infectiousness) (Bankowski et al., in preparation).

Following 8 hrs challenge vaccinated recipients were housed with naïve animals (one-to-one)

Results

All the ‘donor’ animals developed clinical signs of FMD within 2 to 4 days, and subsequent testing for the presence of FMDV showed a concurrent viraemia (Fig. 1-4).

Significant amounts of infectious virus were recovered from air samples during the challenge periods which resulted in successful transmission events (as shown in Table 1). Methodology as Doel et al., 2007.

Table 1.

<table>
<thead>
<tr>
<th>Days post challenge</th>
<th>BTV titration</th>
<th>Conc. of airborne virus in 24 hours</th>
<th>Estimated release of virus during 8 hour challenge</th>
<th>Log mean release of virus during 8 hour challenge</th>
</tr>
</thead>
<tbody>
<tr>
<td>challenge day</td>
<td>log TCID50/ml</td>
<td>TCID/24</td>
<td>TCID/8</td>
<td>TCID/8</td>
</tr>
<tr>
<td>3a</td>
<td>1.4</td>
<td>12752.65</td>
<td>4250.89</td>
<td>3.63</td>
</tr>
<tr>
<td>3b</td>
<td>0.73</td>
<td>2602.54</td>
<td>867.51</td>
<td>2.94</td>
</tr>
<tr>
<td>4</td>
<td>0.73</td>
<td>2065.51</td>
<td>688.50</td>
<td>2.80</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>No detectable virus in BTV isolation from air samples on day 5</td>
</tr>
</tbody>
</table>

Subsequent challenges to ‘recipient’ animals took place on days 3, 4 and 5. Transmission occurred to both vaccinated and unvaccinated recipients in 3 out of 4 cases, with the incubation period ranging between 2 and 7 days, as shown by development of clinical signs (Fig. 5 & 6). Virus was recovered from all the clinically diseased ‘recipients’.

Conclusions

- Transmission occurred from inoculated to donor animals and the incubation period to the onset of clinical signs in the donor animals varied between 2 and 4 days post challenge.
- Presence of lesions in oral cavity, mouth, on tongue or snout correlated with transmission occurrence and proved to be a good indicator of infectiousness, since the ‘donors’ transmitted disease to recipient animals.
- No reduction in transmission was observed as a result of vaccination at day 0. This draws a baseline and helps to establish the experimental design for later time point studies.

References


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