Evaluation of the benefit and feasibility of a vaccination-to-live strategy in FMD free countries

D.C. Hadorn¹, S. Dürr², B. Thür¹, L. Perler¹, T. Jemmi¹
¹ Swiss Federal Veterinary Office, ² Institute of Virology and Immunoprophylaxis
EuFMD Open Session 2012

Materials and Methods

• Simulation of FMD spread (serotype O, middle east) within and between herds (local area spread, direct and indirect contacts) with Davis Animal Disease Simulation model¹

<table>
<thead>
<tr>
<th>General input parameters</th>
<th>Value¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial diagnosis delay</td>
<td>10 days</td>
</tr>
<tr>
<td>Second diagnosis delay</td>
<td>4 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inputs for emergency vaccination</th>
<th>Value¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application delay for 3 km vaccination zone</td>
<td>3 days</td>
</tr>
<tr>
<td>Application delay for 15 km vaccination zone</td>
<td>6 days</td>
</tr>
<tr>
<td>Protection delay for vaccination</td>
<td>14 days</td>
</tr>
<tr>
<td>Vaccine efficacy on herd level</td>
<td>0.9</td>
</tr>
</tbody>
</table>

¹ Dürr et al. Evaluation of the benefit of emergency vaccination in a foot-and-mouth disease free country with low livestock density. Submitted to PVM.

Evaluation of FMD emergency vaccination in Switzerland

Basic questions to be answered to adjust contingency planning:

a) Target species for emergency vaccination (cattle – small ruminants – pigs)

b) Dimension of vaccination zone (3 km = V3 or 10 km = V10)

c) Time frame for emergency vaccination (immediately after detection of first case or later)


…in order to achieve a benefit compared to conventional disease control only

Results

a) Target species for emergency vaccination

- Cattle
- Small ruminants
- Pigs

b) Dimension of vaccination zone and

c) Time frame for emergency vaccination

- No benefit for emergency vaccination under Swiss situation* if vaccination campaigns is started right after detection of first case (neither 3 km nor 10 km vaccination radius)

- Low animal density (<167 ruminants and pigs / km²)

- If the epidemic becomes extensive, vaccination with radius of 10 km around IP may be beneficial in terms of reducing the number of herds infected and the epidemic duration

Results

<table>
<thead>
<tr>
<th>Restriction zone</th>
<th>Measures in terms of animal movement</th>
<th>Minimum duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection Zone</td>
<td>No animal movement between holdings and &lt;30 days After Diag. 15 days...</td>
<td>At least 15 days plus time for holding &amp; Disposal &amp; preliminary cleansing and disinfection</td>
</tr>
<tr>
<td>Surveillance Zone</td>
<td>No animal movement out of surveillance zone; animal movement between holdings permitted after clinical inspection</td>
<td>At least 30 days</td>
</tr>
<tr>
<td>Vaccination Zone</td>
<td>At least 6 months in total</td>
<td></td>
</tr>
<tr>
<td>Phase 1</td>
<td>Hold-off 30 days (e.g. V10 in Switzerland); 30+18 = 48 days</td>
<td>At least 30 days plus time for holding plus 30 days</td>
</tr>
<tr>
<td>Phase 2</td>
<td>No animal movement out of vaccination zone; animal movement between holdings is subject to authorization; unvaccinated animals with restrictions (testing)</td>
<td>30 days plus time for phase 1 and phase 2</td>
</tr>
<tr>
<td>Phase 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Goal of vaccination-to-live strategy:

COUNCIL DIRECTIVE 2003/85/EC
of 29 September 2003

Restriction zone Measures in terms of animal movement Minimum duration
Protection Zone No animal movement between holdings and <30 days After Diag. 15 days... At least 15 days plus time for holding & Disposal & preliminary cleansing and disinfection
Surveillance Zone No animal movement out of surveillance zone; animal movement between holdings permitted after clinical inspection At least 30 days
Vaccination Zone At least 6 months in total
Phase 1 Hold-off 30 days (e.g. V10 in Switzerland); 30+18 = 48 days At least 30 days plus time for holding plus 30 days
Phase 2 No animal movement out of vaccination zone; animal movement between holdings is subject to authorization; unvaccinated animals with restrictions (testing)
Phase 3
d) Feasibility of vaccination-to-live strategy

- Animal movement restriction within vaccination zone (phase 1 and 2) is as severe as in protection zone but more than twice as long

Significant increase in welfare culling, mainly in pig production sector, expected

(26) By means of emergency vaccination without subsequent killing of the vaccinated animals the number of animals to be killed for disease control purposes may be reduced significantly. Appropriate testing should thereafter substantiate the absence of infection.

Discussion

Under Swiss conditions and in terms of the actual legal basis, the feasibility of a vaccination-to-live strategy is not given.

Points to be discussed:

- Adaptation of restriction measures if vaccination zone is established outside protection/surveillance zone (different risk)

- Necessary duration of „stand-still” within vaccination zone (only during vaccine application phase?)

- Adaptation of restriction measures in holdings with and without vaccinated animals (target species of vaccination program?)

Thank you