A study of Pestivirus in eastern Australia:
Farmers’ understanding of the disease and its control

Smith, A .K., Hernandez-Jover, M. & Exton, S.
European Society for Veterinary Virology

http://esvv.eu/?page=meetings&id=37
What do we know about Bovine Pestivirus?

- Bovine Pestivirus = Bovine Viral Diarrhoea virus
- Occurs worldwide
- Classical Swine Fever & Border disease in same virus family
- Clinical manifestations described in 1946 in USA (Olafson et al), but around long before then (e.g. 1483)
What do we know about BVDV/Pestivirus?

- Two genetically separate groups: Type 1 & Type 2 (diverged around 1743 in North America)
- Type 1 separated into sub-groups 1a-1k
- In Aus. predominantly Type 1c, with some 1a
Impact of infection with BVDV Type 1c/1a

- Naive mature animal: Transient infection (TI) → Immune

- Naive Pregnant Dam: poor fertility - breeding period
  embryonic death and abortion
  development of PI calf (1st trimester)
  foetal deformities (2nd trimester)
  neonatal deaths/weakly calves

- PI calf & TI individuals: immunosuppression

- PI calf: noncytopathic biotype → cytopathic biotype = Mucosal disease
BVDV in Australia

- 80-90% of herds exposed
- 30-40% of cattle exposed
- 0.5-1% prevalence of PI animals
- Vaccine (Pestigard®, Zoetis) available since 2003
- Prior to vaccine launch, some protection achieved by deliberate exposure of immunologically naive herd-mates to a PI animal
BVDV in Australia

Meat & Livestock Australia (MLA) report 2006 (Sackett et al) concluded....

- data on prevalence was incomplete
- impact of the disease could not be validated
- difficulties quantifying cost-effectiveness of vaccination
Survey

- 1500 eastern Australian cattle producers, with double mail-out
- Desired sample-size of 400, with a 25-30% response
- 95% confidence interval, assuming 50% conduct any single practice
- Commercial mailing database: 76 Qld, 951 NSW, 473 Vic
Results: Initial outcomes from 1st mailing

• 108 responses (Qld 5, NSW 67, Vic 36)
• 26 respondents (24%) in dairying, remainder beef
• Breeding-cow herd size ranged 50-1950 cows
• Herd dynamics
  - ‘closed herds’ - 38%
  - ‘occasional introductions’ - 50%
  - ‘regular introductions’ - 12%
Results: Understanding about BVDV

Table 1: Percentage of respondents (n=92) which identified each of the listed outcomes as possible consequences from a BVDV infection in a susceptible animal

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Abortion</th>
<th>Birth of PI calf</th>
<th>Poor fertility</th>
<th>Suppressed immunity</th>
<th>Weak neonates</th>
<th>Calf deaths</th>
<th>Deformities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage response</td>
<td>80.4%</td>
<td>78.3%</td>
<td>77.2%</td>
<td>66.3%</td>
<td>66.3%</td>
<td>53.8%</td>
<td>46.7%</td>
</tr>
</tbody>
</table>
Results: Understanding about BVDV

Table 2: Percentage of respondents (n=92) which identified each of the listed routes as possible ways by which BVDV can be transmitted

<table>
<thead>
<tr>
<th>Method of spread</th>
<th>via a PI calf</th>
<th>via saliva and nasal secretions</th>
<th>via abortion material</th>
<th>via transiently-infected animals</th>
<th>via faeces</th>
<th>via semen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage response</td>
<td>90.3%</td>
<td>62.0%</td>
<td>55.4%</td>
<td>50.5%</td>
<td>40.2%</td>
<td>34.1%</td>
</tr>
</tbody>
</table>
Results: Understanding about BVDV

**Question:**
Persistently-infected (PI) animals arise due to...?

<table>
<thead>
<tr>
<th></th>
<th>Foetal infection</th>
<th>Suckling-calf infection</th>
<th>Post-weaning infection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>86.4%</td>
<td>22.2%</td>
<td>21.0%</td>
</tr>
</tbody>
</table>
Results: Advice on BVDV

Question:
Do you seek advice from your vet regarding...?

<table>
<thead>
<tr>
<th>General advice on BVDV</th>
<th>BVDV testing</th>
<th>Vaccination against BVDV</th>
</tr>
</thead>
<tbody>
<tr>
<td>76.6%</td>
<td>67.5%</td>
<td>65.9%</td>
</tr>
</tbody>
</table>

(Proportionally more advice sought in NSW v Vic, P<0.05)
Results: Testing for BVDV

• Testing for BVDV via antibody testing 36% (27/75)

• Testing for BVDV via antigen testing 34.7% (26/75)

• 13 respondents undertook both

• Proportionally more testing conducted in NSW v Vic, 31/49 v 8/25, respectively, P<0.05
Results: Control of BVDV

BVDV control conducted by 35.3% of respondents (36/102)

<table>
<thead>
<tr>
<th>Vaccination</th>
<th>Deliberate exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.3%</td>
<td>16.6%</td>
</tr>
</tbody>
</table>
Results: Sources of vaccine

<table>
<thead>
<tr>
<th>Retailers</th>
<th>Online</th>
<th>Local veterinarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>86.2%</td>
<td>3.4%</td>
<td>10.3%</td>
</tr>
</tbody>
</table>
Results: Vaccination process

- Median period respondents conducted vaccination
  - 5 yrs

- Completion of vaccination course prior to breeding events:
  - range 1 week to >4 months
  - most common interval, 4 – 6 weeks (33%)
  - more than 2 weeks (80%)

- Vaccination of bulls undertaken by 65.5% of producers
Results: Vaccination frequency

- Primary vaccination course consists of 2 injections (96.3%)
- Most common interval: 4-8 weeks
- Correct route of administration (100%)
- Correct vaccine volume (86%)
- Most producers (80%) report vaccinating annually...
  ...but only 56.7% have done so in the past 12 months.
Results: Vaccination practice

- Additional treatments alongside vaccine - 83.3%
- All respondents chill vaccine until the ‘day of use’
- Chilling maintained on day of use – 85.7% [e.g. Ice-brick in cool-box]
Results: Deliberate exposure

- 6 farms: NSW = 4; Vic = 2
- Five report sourcing the PI animal from own herd
- Duration of exposure:
  - 3mo – ‘all year’; mode = 6mo
- Timing of removal prior to breeding:
  - range 2wks – 1mo
  - (1 farm runs PI “all-year-round”)
Conclusions – ‘understanding’

• Varying levels of understanding re: BVDV and its spread
• Impact on fertility and abortion is well-understood...
  ...but the impact on immune system is less so
• Role of the PI calf is well understood...
  ... but the potential involvement of semen and faeces in spreading the virus is less well acknowledged
Conclusions – ‘control’

• Varying levels of engagement – $\frac{1}{3}$ undertake measures

• Use of vaccination is increasing (c.f. Sacket et al, 2006)

• Reasonably good compliance with vaccine datasheet

• Some high-risk behaviour continues (especially timings!)

• Similar concerns about conduct of deliberate exposure
So what?

• We now understand better what producers are doing!

• ...but why are they doing it that way?

• ...what are the drivers?

• ...is it appropriate, or even necessary, to change?
Acknowledgements

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