Bovine virus diarrhoea virus (BVDV) or bovine pestivirus infection of cattle

Michael McGowan
School of Veterinary Science,
The University of Queensland
Issues to consider

- A number of European countries have implemented national BVDV control programs. Should the Australian beef and dairy industries consider implementing a control program?
- What is the role of the seedstock industry in the control of BVDV?
History of BVDV infection in Australia

1946 – first reported cases of BVDV induced disease in cattle in the United states

1957 – first reported diagnosis of Mucosal disease (a syndrome caused by BVDV infection) in Australia

1967 – serological survey of Australian cattle shows that 61% have been previously infected with BVDV and 89% of herds have evidence of BVDV infection
Location of herds with evidence of BVDV infection in 1967 survey

Distribution of infection very similar today
What is the prevalence of BVDV infection in Australia today?

- Recently conducted surveys have shown that 90% of beef and dairy herds have evidence of BVDV infection. This is similar to the US and UK.
- Only Type I strains of BVDV have been isolated from Australian cattle.
- The risk of exposure to BVDV increases with age and thus the group of cattle typically with the lowest proportion of seropositive cattle (i.e., lowest % of immune animals) is the replacement heifers.
- The prevalence of seropositive cattle (i.e., animals which have antibodies to BVDV) varies considerably between herds.
Prevalence of Queensland herds and heifer groups within herds where most cattle were found to have no immunity to BVDV and thus are at risk of an outbreak of BVDV infection

<table>
<thead>
<tr>
<th></th>
<th>Beef herds n = 213</th>
<th>Dairy Herds n = 37</th>
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<tbody>
<tr>
<td>% of herds in which all cattle had no immunity to BVDV</td>
<td>11%</td>
<td>18%</td>
</tr>
<tr>
<td>% of herds in which all heifers in the herd had no immunity to BVDV</td>
<td>36%</td>
<td>53%</td>
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The infection status varies considerably within herds between different management groups.

<table>
<thead>
<tr>
<th>Paddock*</th>
<th>Age Of Cows</th>
<th>No. Cows</th>
<th>% seropositive</th>
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<tbody>
<tr>
<td>I</td>
<td>2 yo Brahman</td>
<td>55</td>
<td>6%</td>
</tr>
<tr>
<td>II</td>
<td>Mixed Mature Brahman</td>
<td>150</td>
<td>40%</td>
</tr>
<tr>
<td>III</td>
<td>2 yo Santa</td>
<td>100</td>
<td>0%</td>
</tr>
<tr>
<td>IV</td>
<td>2 yo Brahman</td>
<td>30</td>
<td>33%</td>
</tr>
<tr>
<td>V</td>
<td>Mixed Mature Brahman</td>
<td>59</td>
<td>80%</td>
</tr>
<tr>
<td>VI</td>
<td>4-5 yo Santa</td>
<td>68</td>
<td>10%</td>
</tr>
<tr>
<td>VII</td>
<td>4-5 yo Brahman</td>
<td>50</td>
<td>10%</td>
</tr>
</tbody>
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* Example from one central Queensland beef cattle property

This paddock almost certainly contains a PI animal and is beside paddocks containing mostly cattle without any immunity to BVDV.
The major source of BVDV infection is direct contact with PI cattle

- PI cattle arise from infection of susceptible pregnant females between 20 and 150 days of gestation. PI cattle shed large amounts of virus in all bodily fluids and excretions.
- In a six year study of 21 dairy herds in SE Queensland 33% were found to contain PI cattle, but annually the incidence varied from 0 to 15%.
- Our best estimate based on recent serological surveys is that at least 40% of herds contain PI cattle. Larger herds tend to have greater risk of a PI being present.
What are the chances that this animal I’m about to introduce to my herd is a PI

- The prevalence of PI animals in groups of dairy calves and yearling heifers, in Qld and NSW was 0.9% and 0.8%, respectively.
- Prevalence of PI’s in feedlot cattle has been reported to be 0.2 to 0.5%.
- Best estimate is that about 1 in 100-200 cattle out there now are PI. Many appear ill-thrifty, stunted, but others are clinically normal. PI cattle have a shortened life expectancy.
Which of these animals is persistently infected with BVDV?
How is BVDV introduced to a management group/herd

1. Most commonly when a clinically normal PI replacement female or bull is inadvertently introduced – introductions may be from outside the property or from within. Mixing of cattle from different sources for various management procedures/reasons e.g. during drought agistment, is likely to be a common means of introduction of infection to previously uninfected groups of cattle.
2. As a result of over the fence contact, or temporary direct contact (flood gates, broken fences) with a neighbouring herd which contains PI cattle

3. Via cattle at agricultural shows or multi-vendor sales coming in contact with a PI animal
4. Via introduction of a female carrying a PI conceptus – may subsequently abort, or deliver a PI calf

- Transmission may occur via contact with infective foetal membranes, fluids, foetus
- Birth of a PI calf in a susceptible breeding mob may result in widespread transmission during next breeding season with losses often not recognised till next calving season
5. Via AI with infected semen or transfer of infected embryos
In situations such as these BVDV transmission may occur within one hour and over 24 hours approximately 60% of susceptible cattle may become infected.
Syndromes caused by or associated with BVDV infection

- Conception failure with females returning to service at either normal or prolonged intervals
- Abortions, stillbirths, premature births
- Birth of weak, abnormal and poor doing calves
- Infectious pneumonia which does not respond as expected to antibiotics
- ‘Immunological cripples’ – PI cattle which develop severe non-responsive manifestations of common diseases
- Acute and chronic mucosal disease – chronic MD more common in Australia
- Higher than expected prevalence of infectious pneumonia and scours due to immunosuppression
What is the economic impact of an outbreak of BVDV infection in a well managed beef herd in which all cattle have no immunity to BVDV?

Annual average after tax loss of $30.38 per breeder over a 13 year period.
Total economic impact

NET AFTER TAX CASHFLOW

250 cow self replacing commercial beef herd. Initial outbreak in heifer herd followed several years later by an outbreak in the cow herd.
What should seed stock producers be doing to minimise the risk of transmitting BVDV to their clients

1. Need to determine the BVDV status of each of their breeding herds
   - if most females in the herd are not immune then should seriously consider vaccination and implementation of biosecurity measures to prevent risk of outbreak of infection
   - if there is evidence of BVDV infection in the herd then should test all male and female sale cattle to verify they are not PI’s and implement a BVDV control program to identify PI breeding females and prevent further PI’s being produced
2. Should consider risk and impact of BVDV infection in sale cattle when they are introduced to new property

- Vaccination of sale cattle will control negative effects in critical first year of breeding and if herd of origin is infected then will prevent introduction of BVDV to client herd
Vaccination schedules

- Standard is initially vaccinate females twice 4 weeks apart commencing 8 weeks prior to start of mating.

- Recently approved modification – interval between 1st and second vaccinations can be up to 6 months.

- An annual booster can be given and pregnant females can be vaccinated.
Take Home Message

- BVDV has been shown to cause significant economic loss in beef and dairy herds
- One of the most common ways BVDV is introduced to herds is via purchase of replacement breeding cattle
- Routine testing to verify that all breeding cattle sold are not PI’s should be considered as part of the QA program for seedstock producers. The tests available to detect PI’s are highly accurate, not expensive and can be performed on samples from young calves. Verification that an animal is not a PI could become part of the registration process.
For further information

- Guidelines for the diagnosis and control of BVDV In Australian beef and dairy herds and feedlots have been developed by the BVDV Technical Advisory Group