Summary of modelling impact of BVDV in Australian dairy farms

Using *BVD Farm Model V 1.0*

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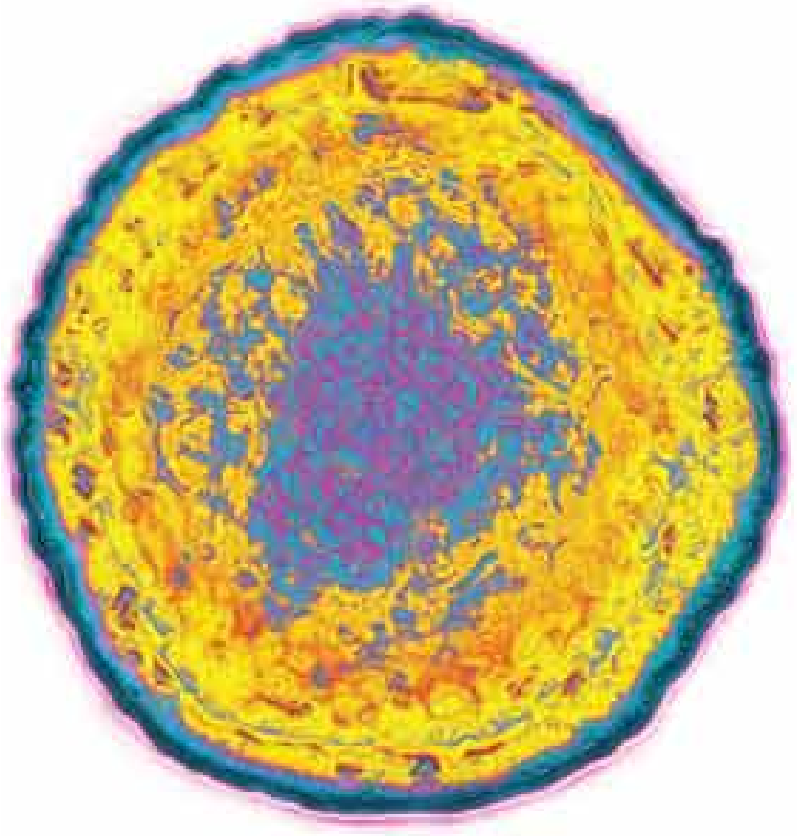

Dairy Australia

HERD HEALTH

1 Model findings

The following conclusions are drawn from analysis of model output:

1. Endemically infected dairy herds within endemic regions typically do not experience noticeable physical or financial losses due to BVDV. This is because most endemically infected herds experience few infections in susceptible animals whilst at the vulnerable stage of their reproductive cycle and because most herds are similarly impacted — resulting in similar average performance of herds across the region. However, all endemically infected herds experience some physical and financial loss from circulating BVDV over time.

2. Endemically infected herds within endemic regions experience natural cycling of virus. The number and proportion of susceptible and näive animals change due to infection and from natural herd turnover. These cyclical changes in herd immunity alter the amount and frequency of virus circulation in the herd. The calving pattern, herd size and herd group management structure influences the compartmentalisation of the herd and this influences the BVDV infection cycle.

3. Endemically infected herds within endemic regions can spontaneously eradicate virus when reservoirs (PIs) are lost and not replaced (i.e. no Trojans) and as herd immunity builds thereby preventing ongoing virus transmission. There is a high background risk of re-infection in herds that spontaneously eradicate BVDV and take no controls against reintroduction of virus. A ten-year virus eradication and re-introduction cycle for dairy herds in endemic regions appears evident from herd serological profile studies.

4. Permanently-infected (PI) animals are the main reservoir of infection in herds. Transiently infected (TI) animals do not persist with circulating virus for more than a few days. Removal of PIs from a herd (and all Trojan pregnancies) typically results in rapid loss of virus from the herd — persistence of virus in the absence of a PI beyond one month is not common.

5. Controls to identify and eradicate BVDV from infected herds are effective. Individual-animal tests for exposure (antibody) and for circulating virus (primarily used to detect PIs) are highly sensitive and specific. Bulk milk testing for virus has modest correlation between bulk milk ELISA level and herd seroprevalence — infrequent bulk milk testing does may not accurately represent the current or recent infection/exposure status of the milking herd. Most herds that embark on a test-and-cull program identify all virus-carrying PIs and are typically virus free well inside of one year.

6. Long-term control of BVDV in endemically-infected dairy herds within endemic regions is a break-even economic proposition for most herds. Any extra return from controlling BVDV circulation is generally offset by the extra cost of running

the control program. This means that most farmers can make more profitable investments on their dairy farms elsewhere rather than from investing in BVDV control. The long-term economics of controlling BVDV in endemically-infected year-round herds is more compelling than for split calving or seasonally calving herds. This is because the average annual endemic losses are greater in year-round calving herds than for split- or seasonally-calving herds — however, the benefit-cost ratio and absolute return from control are modest.

7. Whilst the long-term endemic loss from BVDV in dairy herds is small, BVDV can produce large-scale outbreaks in näive herds. This can result in business-threatening economic losses — depending on the number and class of stock infected and the timing of the outbreak relative to the reproductive cycle of the herd. Farmers and advisors need to understand the risks and impacts of larger-scale outbreaks in their herds when selecting a BVDV control strategy — knowing the long-term average cost-benefit of control is insufficient information on which to base a control decision.

8. All BVDV control strategies — including choosing not to control BVDV — will change the future herd outbreak risk profile. Some strategies focus on managing the susceptibility of the herd to infection (e.g. vaccination) whilst other control strategies focus on reducing the risk of virus introduction (e.g. bull testing). Some strategies will increase the susceptibility of the herd (by making the herd näive) but offset this by reducing the risk of virus re-introduction. These controls are very sensitive to program breakdown. Strategies that manage (decrease) herd susceptibility to infection tend to be more resistant to intermittent and partial program failure.

9. Control of BVDV is economical over the long-term in typical infected year-round dairy herds. However, control is more likely to be a break-even investment for most infected split and seasonally-calving dairy herds. Deciding to leave BVDV unmanaged may be a rational strategy for some split- and seasonal-calving herd managers.

10. Effective control of BVDV will reduce the circulation of virus in herds. This will result in increasing näivety and susceptibility of the herd over time as natural immunity wanes. Maintaining virus freedom in free herds with a control program depends upon the combined effectiveness of biosecurity to preventing virus re-introduction and use of timely biosurveillance to detect and cull any PIs that have gained entry to the herd before mating.

11. Bulk milk ELISA monitoring is poorly predictive of herd seroprevalence and therefore immunity. Annual bulk milk ELISA testing is not an effective way to monitor herd infection and immunity status.

12. More comprehensive control strategies — programs that combine high-level biosecurity and biosurveillance (including PI hunts where required) — do not provide

sufficient extra return or a sufficient reduction in risk of low financial performance to recommend their use. The long term cost of the program outweighs the extra benefit obtained over simpler and cheaper control programs

2 BVDV — draft key messages

1. Never knowingly introduce BVDV into a herd — irrespective of the herd's status. Whilst testing of all introductions for the presence of virus may not be economical in all circumstances all herd bull introductions should be tested to ensure they are not PIs. Never admit a bull of unknown status to a dairy herd. The magnitude of impact of a viraemic herd bull during mating is great and this outweighs the small cost of vaccination for herd bulls. All identified PI bulls should be removed before they are used or exposed to the female herd.

2. Consider your attitude to risk, capacity to implement effective biosecurity and biosurveillance and the background virus challenge of your farm when selecting a control strategy. Consider including vaccination into your control program if you are risk averse or their are obstacles to implementing effective biosecurity and biosurveillance and/or there is likely to be significant external viral challenge for your herd if you decide to actively control BVDV.

3. If you choose to eradicate BVDV from your herd, once it is eradicated, routinely monitor immunity in yearling and cows or commence routine vaccination. Discuss options with your veterinarian. Bulk milk ELISA is poorly correlated with cow-level seroprevalence making once-off bulk milk testing only moderately effective for assessing the level of immunity in the herd.

4. Always test all introduced bulls to ensure none are persistently infected with BVDV.

    - Talk to your vet about testing bulls for persistent infection.
    - Only one test in each bull's life is necessary as cattle cannot become persistently infected after birth. Initially test all bulls then test each newly introduced bull well before it is required for use.
    - Expect most bulls to test negative. Persistently infected bulls are uncommon but can have devastating effects. The aim of bull testing is to ensure no persistently infected bulls cause problems in your herd.
    - Cull persistently infected bulls. Never allow contact between persistently infected bulls and female cattle.

5. If you wish to assess the proportion of animals in a mob or a milking herd that are immunologically naïve to help decide whether to vaccinate, test 30–40 representative animals.

- When assessing milking herds, only a very low bulk milk ELISA result is informative, generally indicating that most milking cows are immunologically näive.
- A moderate to high bulk milk ELISA result provides little information about the proportion of milking cows that are immunologically näive and subsequent testing of 30–40 representative animals is required.
- Because very low bulk milk ELISA results are uncommon, proceeding directly to testing representative animals may be more efficient than first testing bulk milk.

6. If you choose to undertake additional BVDV control options, consider simpler and cheaper options over more complex and expensive options. Discuss options with your veterinarian.
   - Even in typical year-round calving herds, only the simpler and cheaper BVDV control options result in modest increases in herd profitability and reduction in risk of low profit years.
   - Over the long term, more complex and expensive options reduce herd profitability.
7. If your herd calves year-round, consider discussing additional BVDV control options with your veterinarian. If your herd uses seasonal or split calving and there are ongoing health problems in young stock or cows, discuss with your veterinarian whether BVDV may be contributing to these.
   - In typical year-round calving herds, over the long term ongoing BVDV control can result in modest increases in herd profitability and some reduction in risk of low profit years.
   - In typical seasonal and split calving herds, over the long term, BVDV control has a net cost and increases the risk of low profit years.

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