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Infection of pregnant ewes with bovine viral diarrhoea in mid-gestation and the development of persistently infected lambs

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Bovine viral diarrhoea virus (BVDV) is an important pathogen of cattle causing severe economic losses to both cattle producers and industries due to the immunosuppression and reproductive losses in infected animals (Nettleton and Entrican, 1995). BVDV has been found in 86% of Australian cattle herds (Taylor, 2010) however previous studies have also shown that BVDV infection can occur in other species including goats, sheep, pigs, camels and deer (Passler and Walz, 2010).

In 2012, Australia had a total of 6,526 mixed sheep and cattle farms (Australian Bureau of Statistics, 2013), representing a potential risk for cross-species transmission. Lambing rates for ewes infected with BVDV during pregnancy are low with high lamb losses and the birth of persistently BVDV infected (PI) lambs being reported (Scherer et al., 2001). Previous studies have described the effects of BVDV infection on sheep however they have used types, or strains, of the virus not commonly found in Australia (Ridpath, 2010). As such these results may not be indicative of the losses associated with BVDV infection of sheep in Australia.

From earlier works at the University of Adelaide we determined that BVDV 1c infection in pregnant ewes resulted in low lambing rates (52%) and high young lamb deaths (37%). The study also revealed that mid-gestational infection with BVDV 1c can result in PI lambs, however the long term viability of these animals remains uncertain.

To better understand the risk of BVDV on sheep populations in Australia, the aims of this current project are to determine if viable BVDV PI lambs can be produced following mid-gestational infection of ewes with BVDV 1c and, in turn to determine if cross-species transmission between PI lambs and BVDV naïve cattle by co-mingling can occur naturally.

A group of BVD and border disease naïve ewes will be synchronised and naturally mated before being split into: a sub-group of pregnant ewes which will be infected with BVDV between 50 and 60 days gestation and a sub-group of pregnant ewes which will not be infected. Weekly blood sampling will be undertaken for 6 weeks to determine when the ewes seroconvert to the infection. All ewes will be pregnancy-scanned fortnightly until lambing to better understand the foetal development and losses following mid-gestational infection.

At lambing there will be three groups of lambs, those that are both antibody and antigen negative for BVDV (BVDV naïve), those that are antibody positive and antigen negative for BVDV (naturally immune) and those that are persistently infected with BVDV (antibody and antigenpositive). Birth weights, growth weights and survivability of the lambs within these three groups will be compared in order to determine the cost of BVDV infection to sheep farming producers. Finally the group of persistently infected lambs produced will be co-mingled with a group of BVDV naïve cattle. Cross-species transmission will be studied to help determine the level of risk posed by sheep populations to any control and eradication campaign of BVDV within Australia.

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