Colonies may be virulent (Takai R. equi of these. In Ireland, where pasture cover and soil moisture were both high, the stable/barn for grazing (Muscatello et al. 2006a). In Australia, the yards used for vet work and the dry and dusty laneways between the paddocks and transient mares have been associated with increased incidence and prevalence of R. equi disease (Chaffin et al. 2003c; Muscatello et al. 2006b).

R. equi is a soil inhabitant that survives and multiplies in the equine gastrointestinal tract (Barton and Hughes 1984), thriving on the volatile fatty acids found in horse faeces (Hughes and Sulaiman 1987). Virulent strains of R. equi possess an extrachromosomal virulence associated plasmid (Takai et al. 1991a,b; Giguere et al. 1999), which codes for several virulence associated proteins, particularly vapA (Jain et al. 2003).

Excretion of both virulent and avirulent R. equi in faeces is an important source of contamination of the soil on horse farms (Prescott 1984; Takai 1997). Foals shed much higher concentrations of R. equi than mares (Takai et al. 1994; Grimm et al. 2007). Faecal excretion of R. equi in the healthy foal peaks between 3 and 12 weeks of age and up to 80% of these R. equi colonies may be virulent (Takai et al. 1994). Therefore, it was thought that the faeces of foals was the most important source of virulent R. equi contamination on farms and that removal of faeces was a useful tool in reducing environmental burdens (Prescott 1987; Barton 1991). Unfortunately, the level of virulent R. equi in the soil alone is not an accurate predictor of disease prevalence or disease risk (Martens et al. 2000; Muscatello et al. 2006a), so the faecal-oral cycle of R. equi transmission is probably irrelevant to disease epidemiology while the virulent organism remains soil-bound and unable to be aerosolised and inhaled.

Inhalation of aerosolised bacteria associated with dust has been described as the major route of pulmonary infection in foals (Prescott 1991). The prevalence and incidence of R. equi pneumonia is associated with the airborne virulent R. equi burden and the age of the foal when sampled (Muscatello et al. 2006a,c). Environmental factors, including low soil moisture, sparse pasture cover and high ambient temperature aid in the aerosolisation of virulent R. equi from soil. Previously, specific sites on farms such as stables have been implicated as significant sources of R. equi respiratory infection (Prescott 1984; Cohen 2005). On Australian farms, the yards used for vet work and the dry and dusty laneways between the paddocks and the yards had approximately double the concentration of airborne virulent R. equi detected on grass covered paddocks used for grazing (Muscatello et al. 2006a,b). In Ireland, where pasture cover and soil moisture were both high, the stable/barn was the site where significant virulent R. equi aerosol challenge was likely to occur. The frequency of detecting airborne virulent R. equi in the stables was significantly greater than the paddock (odds ratio 17.3) on endemically affected farms (Muscatello et al. 2006c). These findings support the anecdotal and experimental evidence that inhalation of virulent R. equi is the main route of pulmonary infection of the foal and indicate that the size of the aerosol virulent R. equi challenge influences the likelihood of disease.

Virulent R. equi, an intracellular pathogen of the equine lower respiratory tract, has been detected in the exhaled breath of foals with and without overt clinical signs of R. equi bronchopneumonia, which suggested a possible contagious epidemiology (Muscatello 2005). Air samples were collected in yards before, during and after mustering. The

Medical Conditions of the Young Horse
Chaired by Tim Brazil

15.00–15.25

R. equi: The Australian experience

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concentrations and proportion of virulent *R. equi* in the air samples collected from the respiratory zone of foals after the dust had settled were significantly higher than levels of virulent *R. equi* detected during or before mustering (Muscatello 2005). These findings suggested that aerosol transmission of virulent *R. equi* can occur and may be a route of transmission despite management strategies designed to reduce aerosol burdens from inhalation of contaminated dust.

Management strategies that reduce exposure of foals to aerosolised virulent *R. equi* are the key to reducing the risk of disease. In Australia, irrigation of yards and lanes prior to mustering was found to significantly reduce the aerosolisation of virulent *R. equi* from soil (Muscatello et al. 2006b). We recommend that areas with soil of low water-holding capacity (sandy areas) and poor pasture cover not be used for mares and foals as these factors increase the risk of aerosolisation of the organism. Keeping large mobs of foals confined in yards, pens or small paddocks will also result in highly trafficked, dusty environments with higher concentrations of faecal-soil derived virulent *R. equi* in the foals' breath. This practice also increases the potential for foal-to-foal respiratory contact with possible transmission of virulent *R. equi* to susceptible foals.

REFERENCES