

Rhodococcus equi-specific hyperimmune plasma administration decreases faecal shedding of pathogenic *R equi* in foals

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Introduction

Rhodococcus equi is the most common cause of pneumonia in young foals worldwide. Thus, minimising the concentration of pathogenic airborne *R equi* is key to reducing the risk of development of pneumonia.

Foals with pneumonia are the major source of environmental contamination because they shed high amounts of *R equi* in their faeces. As *R equi*-specific hyperimmune plasma (HIP) administered intravenously shortly after birth decreases the severity of rhodococcal pneumonia, it is valid to hypothesise that its use would also be associated with a reduction in the shedding of *R equi* in faeces.

The aim of this study was, therefore, to investigate the effect of HIP administration on faecal shedding of *R equi*.

Approach

Twelve foals that received HIP 24 to 48 hours after birth and nine foals that did not were included in the study. All foals were experimentally infected with *R equi* in the first week of life. Faeces were collected before infection and two, three, five and seven weeks after infection.

DNA was extracted from the faeces using a commercial kit, and real-time, quantitative PCR (qPCR) for *vapA*, a gene present only in pathogenic strains of *R equi*, was performed. Faeces spiked with

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KEY FINDINGS

- Intravenous administration of hyperimmune plasma to neonatal foals significantly decreased faecal shedding of *Rhodococcus equi*.

an *R equi* pure culture were used as an extraction control. Absolute quantification was obtained using a standard dilution curve of the purified plasmid.

Descriptive statistics were used to characterise the number of weeks for which faeces were positive for *R equi*. Comparison of the qPCR results was performed using Pearson's chi-square test, and the *R equi* bacterial count was compared between groups using the Mann-Whitney U test.

Results

Fifty-eight samples from the HIP group and 43 from the control group were tested. Eleven (10.8 per cent) postinfection faecal samples were qPCR positive for *vapA*. There was strong evidence of an association between HIP treatment in the first week of life and a decrease in faecal shedding of *R equi* ($P=0.03$). Foals in the control group

shed significantly more *R equi* than foals that received HIP ($P=0.008$) (Fig 1).

All foals in the control group that developed pneumonia (4/9) shed *R equi* in their faeces, while none of the foals that received HIP and developed pneumonia (2/12) did.

Interpretation

Although a lower level of faecal shedding was observed after HIP administration, this study was not designed to evaluate the effects of the reduction of environmental *R equi* on subsequent cohorts of foals. Further studies are needed to determine whether the observed reduction in faecal shedding of *R equi* results in a decreased risk of infection.

Significance of findings

This study demonstrates that administering HIP to neonatal foals significantly decreases faecal shedding of *R equi* after experimental challenge. While this effect was expected, based on the previous finding that foals that received HIP developed significantly less severe pneumonia, it had not been experimentally demonstrated before.

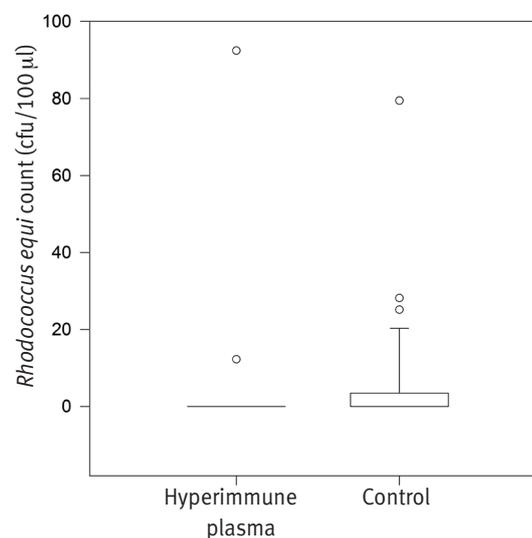


Fig 1: Foals that received hyperimmune plasma shed significantly less *R equi* in their faeces than foals that did not. cfu Colony forming unit