

FOAL MANAGEMENT: *Rhodococcus equi*

Infection with *Rhodococcus equi* can cause a fatal pneumonia in foals and has a profound economic impact on the horse industry.

All foals are exposed to the ubiquitous soil-borne *Rhodococcus equi* bacteria but only some develop disease. Why?

Current research suggests that factors affecting whether a foal develops fatal disease are related to:

1. Stud practices,
2. The environment,
3. The bacterial strain,
4. Early detection and treatment,
5. The foal's immune system.

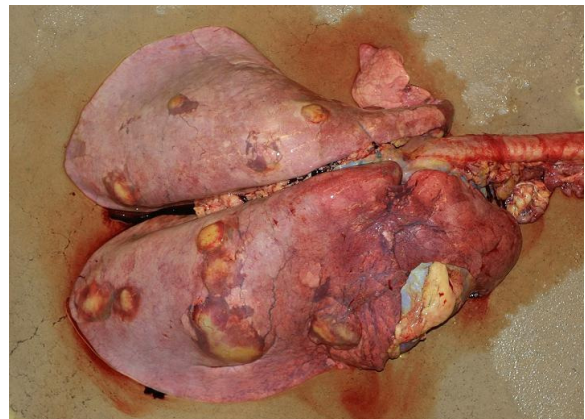
A few facts about the ecology of these bacteria can help in understanding the best stud practices to put in place:

- R equi is shed in very high levels in the faeces of affected foals,
- The bacteria breed and multiply best in horse faeces in warm temperatures (>30°C),
- The main route of infection is through breathing airborne bacteria,
- The bacteria can be found in highest levels in the surface layers of soil.

The level of exposure to virulent *Rhodococcus equi* (or burden or dose of bacteria) is related to whether a foal develops disease.

Therefore stud practices that aim to reduce the burden of exposure of foals to *Rhodococcus equi* need to be put in place to manage this disease if it is a problem, including:

1. Reduce exposure of young foals (less than four months of age) to horse faeces,
2. Reduce exposure of young foals to soil dust,
3. Reduce young foal stocking rate, especially in the warmer months.



Lungs from a foal showing typical abscesses caused by *Rhodococcus equi* infection. The disease can be rapidly fatal in foals up to six months of age.

Some practical measures include:

- Reduce exposure of young foals to barren laneways,
- Keep any highly used laneways clean,
- Water down laneways prior to foals using them,
- Keep stables clean of faeces and use bedding that does not produce dust,
- Use antiseptic solutions to clean stable floors,
- If possible, spread the foal crop over a longer but earlier (cooler) period.

It has been shown conclusively in the literature that for foals to develop disease they must be exposed to *Rhodococcus equi* strains containing a virulence plasmid that produces virulence associated proteins¹. These proteins allow the bacteria to survive and multiply inside lung macrophages and to avoid the immune system, which allows abscess formation. The prevalence of the virulent strains varies geographically. Therefore, some studs will suffer a higher incidence of the disease compared to others based on location. Nonetheless, it is still the burden of exposure to virulent bacteria that plays a significant role in whether a foal develops disease or not.

The latest in veterinary management of *Rhodococcus equi* infection aims to detect virulent infection as early as possible and to treat aggressively with powerful combination antibiotic therapy. Early detection is currently best achieved by using chest ultrasound examination every two weeks until about the age of four months when the foal's immune system becomes more competent. Ultrasound examinations detect the presence of lung abscesses characteristic of *Rhodococcus equi* infection.

The preparedness of the foal's immune system is important in fighting the bacteria once a foal is exposed. It is well known that foals are born without any disease-fighting immunoglobulins and that these are obtained from the mare through colostrum. It is less well known that the foal's cellular immune system is immature, making them particularly susceptible to *Rhodococcus equi*.

There are no effective vaccines for *Rhodococcus equi*. Therefore, vaccination of the mare to increase colostrum antibodies, or vaccination of the foal to increase circulating antibodies is not available as a management option.

Hyperimmune plasma, such as Equiplas R, contains measured high levels of specific antibodies to the virulence associated proteins of

Rhodococcus equi and can be used successfully in the preventative management of this disease. In addition, other factors in adult hyperimmune plasma can act as conditioning agents for the foal's cellular immune system.

In summary, current best practice with respect to managing *Rhodococcus equi* on horse studs is:

1. Aim to reduce the burden of *Rhodococcus equi* that foals are exposed to,
2. Contact your veterinarian and monitor foals up to four months of age using ultrasound – treat aggressively if lung abscesses are found,
3. Give foals the best start in life by treating them with Equiplas R containing high levels of antibodies to *Rhodococcus equi* virulence associated proteins in the first few days of life, and at three to four weeks of age.



Barren and unclean common areas, such as laneways, can act as a source of *Rhodococcus equi* infection in young foals. Limiting exposure of foals to such areas and keeping these areas clean and dust-free is good management practice.

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¹ A plasmid is a piece of circular DNA found in bacteria. They are most noted for carrying antibiotic resistance. In the case of *Rhodococcus equi*, the virulence plasmid carries genes that produce virulence associated proteins that cause virulence.