

RIRDC  **EQUINE**  
**RESEARCH NEWS**



Australian Government  
Rural Industries Research and  
Development Corporation

NEWSLETTER OF THE RIRDC HORSE PROGRAM

AUGUST 2010

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TO BEAT EQUINE LAMINITIS**
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# INDUSTRY PROFILE

## DR DAVID ALDEN

Dave Alden has been a member of the Rural Industries Research and Development Corporation (RIRDC) Horse Committee since the beginning of this year and is the Senior Research Manager for Honeybee, Horse, Organics & Pollination programs at RIRDC.

### WHAT IS YOUR ROLE ON THE HORSE COMMITTEE?

My role, along with Helen Moffett who is our Horse Program Coordinator here in Canberra, is to work with the Research Manager, Nigel Perkins, to manage the Horse Program. We ensure RIRDC invests in research projects that are consistent with the Program's Five Year Research and Development Plan. I work with the committee to ensure we adhere to RIRDC's principles of good governance and make sure projects are meeting milestones and budgets.

### WHAT IS YOUR BACKGROUND IN RESEARCH?

I consider myself a professional research administrator, with a strong focus on agricultural industries. My doctorate, which I completed in 1992 considered the impact of climate change and trade liberalisation on agricultural commodity markets. I have been a lecturer in environmental and ecological economics, and natural resource management at Melbourne University and before that I lectured in the UK.

I left academia to work for the Australian Fisheries Management Authority, where I managed a number of fisheries. For six years I managed the research required to assist the Authority make management decisions about these fisheries.

It was a natural progression to go from the fisheries industry to my role at RIRDC in managing research for the programs in honeybees, pollination, horses and organics.

Although I used to consider myself a keen rider, it is my daughters that now spend much of their time with our two horses – an Australian Stock Horse and a quarter horse.

### WHY IS INVESTMENT IN RESEARCH IMPORTANT FOR THE HORSE INDUSTRY?

The horse industry in Australia contributes more than \$6.3 billion to

the economy and there is an increasing capacity to adopt the R&D outcomes that we deliver. RIRDC invests in research that can assist the industry tackle important issues. The horse industry in Australia has so many varied stakeholders with different issues and different research needs so I work with the other committee members to decide on the research priorities and investment decisions each year for the Horse Program.

Over the last four years of our current five year R&D plan, we have had some big challenges and achievements. We have undertaken projects in neonatal death, race course and rider safety, wastage, nutrition, respiratory disease, laminitis, placentitis, lameness and reproduction. The outbreak of Equine Influenza (EI) in Australia in 2007 placed the industry in crisis and in 2008 RIRDC implemented an ongoing project to look at the spread of the disease in Australia.

I attended the Australasian Equine Science Symposium in June this year and was impressed with an excellent showcase of investment in equine research, both from Australian and overseas researchers. It was clear the RIRDC funded projects were delivering world class research.

### WHY IS IT IMPORTANT TO HAVE A MIX OF PEOPLE ON THE HORSE COMMITTEE?

The Horse Committee currently has a great mix of people who can contribute their expertise and experience from all different aspects of the industry. There is such a broad range of stakeholders in this industry, a balance of different industry representatives, scientists and researchers is very valuable in making research decisions.

The next five year R&D plan for the Horse Program is currently being drafted and the input from both the Horse Committee and the industry will be taken into account to determine our priorities for the next 2011-2016 plan.



*Dr David Alden*

## RIRDC HORSE COMMITTEE

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Consultant Equine Veterinarian

*Dr Nigel Perkins (Research Manager)*

Director

AusVet Animal Health Services

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Animal nutritionist, Australian national

champion dressage rider

*Dr David Alden*

Senior Research Manager

Established Rural Industries

RIRDC

*Helen Moffet*

Program Manager

RIRDC

# RIRDC HORSE RESEARCH RATTLES IN FOALS

## THE USE OF BREATH SAMPLING IN NEONATAL FOALS

BY CATHERINE CHICKEN  
BVSc, MACVSc, DipVetClinStud—  
SCONE VETERINARY HOSPITAL

*Rhodococcus equi* (*R. equi*) is a robust soil organism widespread in the environment of horses that causes a chronic bacterial pneumonia in foals, up to around 6 months of age, commonly referred to as “rattles”\*. It may become established as an endemic disease on some breeding farms and has proven difficult to diagnose in foals until the disease is well established.

### BACKGROUND

Disease caused by *R. equi* infection results in substantial economic losses through medical costs, foal mortalities and labour required for treatment of affected foals. It has been ranked amongst the four most important disease problems of the horse industry. Early diagnosis of rhodococcal pneumonia in foals is therefore of vital importance to reduce the impact of disease on the horse breeding industry.

Not all environmental *R. equi* are capable of causing disease in foals, rather a subset of genetically distinct strains called virulent *R. equi* cause disease. Many researchers believe foals are exposed to virulent *R. equi* and subsequently infected at, or very soon after, the time of birth. However, there is no conclusive evidence to support that exposure early in life necessarily results in disease in individual foals.

### THE STUDY PROJECT

Breath sampling has previously been used in studies at the herd level to determine the risk factors for development of rhodococcal pneumonia on farms. The RIRDC funded research project *Rattles in foals: breath sampling in neonatal foals for prediction of Rhodococcus equi infection* aimed to determine whether exhaled breath samples, measuring exposure to virulent *R. equi* in neonates, had any relationship to subsequent *R. equi* infection in foals up to 2 months of age.

In this study, a portable air sampling device was used to obtain breath samples from neonatal foals and the concentration of virulent *R. equi* recovered was recorded. Background samples of air were also collected to compare the concentration of virulent *R. equi* exhaled by foals to that in the surrounding environmental air.

Follow-up breath samples were then collected from foals at between one and two months of age to determine

if there was any association between the exhalation of virulent *R. equi* by individual foals and the detection of *R. equi* pneumonia (using ultrasonographic screening of the chest) in those foals.

### RESULTS

Virulent *R. equi* was detected in the exhaled breath of some, but not all, neonates and there was no significant relationship between detection of virulent *R. equi* in the breath of neonatal foals and subsequent ultrasonographic diagnosis of rhodococcal pneumonia in those individuals. Breath sampling of neonates was therefore of little value in predicting the development of *R. equi* pneumonia in the individual foal.

The median concentration of virulent *R. equi* in the exhaled breath of neonates and 1-2 month old foals was not significantly different from that of the surrounding air over the study period, however, the proportion of 1-2 month olds exhaling virulent *R. equi* was significantly greater than neonatal foals. This did not have any association, however, with the likelihood of disease occurrence in individual foals.

The results of this study indicate that the use of breath sampling for the prediction of rhodococcal pneumonia in young foals is of no additional value on farms where early screening techniques, such as thoracic ultrasonography, for disease detection are already employed. This contrasts with previous studies that showed measuring levels of virulent *R. equi* in breath and environmental air samples to be useful indicators of disease prevalence and risk at the herd and farm levels. The findings of this study were unable to identify breath sampling as an improved means of early diagnosis of rhodococcal pneumonia in young foals.

A REPORT ON THIS PROJECT WILL  
BE AVAILABLE FROM RIRDC SOON



Stock image

\* see glossary on page 8

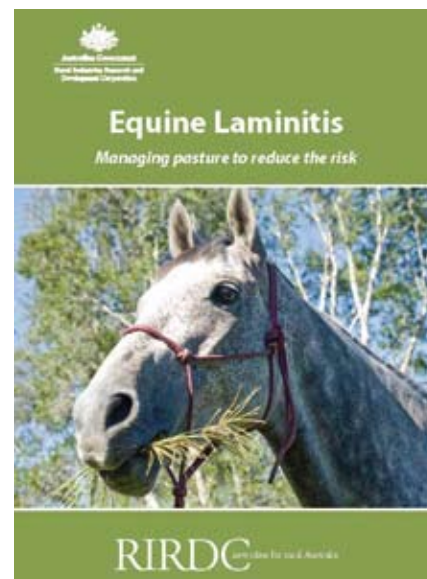
# RIRDC HORSE RESEARCH BETTER MANAGEMENT TO BEAT EQUINE LAMINITIS

PROFESSOR CHRIS POLLITT, UNIVERSITY OF QUEENSLAND & KATHRYN WATTS,  
ROCKY MOUNTAIN RESEARCH AND CONSULTING (UNITED STATES)

Laminitis (founder) is a leading cause of death in horses and impacts both financially and emotionally on the industry.

A study funded by the Rural Industries Research and Development Corporation (RIRDC) aims to explain how environmental conditions can trigger increases in non-structural carbohydrates (NSC) content in pasture or hay and how this may be managed to prevent laminitis.

Led by Professor Chris Pollitt from The University of Queensland and Kathryn Watts from Rocky Mountain Research and Consulting (United States), the study is a collaborative effort with funding provided by RIRDC. The study *Equine Laminitis: Managing Pasture to Reduce the Risk* aims to address the problem of laminitis by thoroughly examining existing forage science literature as well as consulting leading horse and pony managers.



## BACKGROUND OF LAMINITIS

Laminitis is the most serious disease of the equine foot and can lead to long-lasting, crippling changes in anatomy (chronic laminitis or founder).

In a normal horse or pony, the distal phalanx (coffin or pedal bone) is attached to the inside of the hoof by a suspensory apparatus.

A horse has laminitis when the lamellar suspensory apparatus fails either suddenly or gradually, causing the distal phalanx to be driven down into the hoof capsule. The weight of the horse and forces of

locomotion cause the displaced distal phalanx to crush important arteries, veins and nerves while damaging the corium of the coronet and sole. This can cause unrelenting pain in the feet and lameness.

Ponies and some horse breeds are more susceptible to laminitis than others and it is likely that there are phenotypic or genetic factors that determine susceptibility or resistance. New evidence also suggests that metabolic factors such as obesity, insulin resistance and hyperinsulinaemia\* may also be significant contributors.

## BETTER MANAGEMENT PRACTICES TO PREVENT LAMINITIS

Horses and ponies consuming pasture and hay rich in NSCs (sugar, starch and fructan) are at an increased risk of developing laminitis. The owners of animals, especially those that are prone to laminitis, need to realise that pasture and animal management are imperative to prevent the condition.

A major cause of NSC accumulation is plant stress. Pastures that are limited in their ability to grow still undergo photosynthesis and thus accumulate sugars. The high sugar level triggers the formation of storage polysaccharides; either fructan or starch. Some types of grass will be stressed more when conditions are hot, others when it is cool. Drought is also another significant cause of plant stress.

Pastures vary in their responses to different environmental extremes so it becomes important to know how your own pastures will react. All pastures will be affected by drought in some way, meaning that during these times careful measures must be taken to limit the exposure of animals especially after drought breaking rain.



*Ponies and some horse breeds are more susceptible to laminitis.  
Photo – Kathryn Watts and Christopher Pollitt*

\* see glossary on page 8

Limiting access to pastures to reduce intake will aid prevention. Various strategies exist including using grazing muzzles, strip or cell grazing, restricted grazing time or the use of a sacrifice area. This involves establishing a secure, flat, bare and partially shaded yard where the animal has no access to pastures thus limiting exposure to highly NSC concentrated pastures.

Overgrazing, in particular, is a common mistake made by owners in trying to manage laminitis as it results in the depletion of native species, leaving the ground prone for broadleaf weeds, high in NSC, to become established. Rotational or cell grazing can be adopted to prevent horses eating down to the base of the plants.

Animal management strategies are also considered. These includes daily observation of animals both for early laminitis detection and to assess pasture intake; maintenance of lean bodyweight to decrease animal obesity and its associated risk of laminitis and; regular exercise to both improve insulin sensitivity and weight.

Although there are many contributing factors to the development of laminitis, the likelihood of its appearance may be lessened by following the management practices described in the study. RIRDC funded research carried out by the Australian Equine Laminitis Research Unit

(AELRU) will continue to explore means of preventing this condition to lessen its impact on the industry.

*RIRDC Publication no. 10/063  
Available for download (free)  
or purchase (\$25) on the RIRDC  
website: [www.rirdc.com.au](http://www.rirdc.com.au)*



*Grazing muzzles limit grass and thus NSC intake by horses at pasture.  
Photo – Darrin Hatchman*



*Rotational or cell grazing can be adopted to prevent horses eating down to the base of the plants.  
Photo – Kathryn Watts and Christopher Pollitt*

**RIRDC'S HORSE PROGRAM IS AUSTRALIA'S NATIONAL HORSE RESEARCH AND DEVELOPMENT PROGRAM - A PARTNERSHIP BETWEEN INDUSTRY AND GOVERNMENT THAT DELIVERS SIGNIFICANT BENEFITS BACK TO YOU.**

**CONTRIBUTORS:** The Federal Government, Australian Racing Board, Racing Information Services Australia, Australian Stock Horse Society, Equestrian Federation of Australia, Equine Veterinarians Australia, Logan Livestock Insurance Agency Pty Ltd, International Racehorse Transport, Tyreel Stud and Howard Insurance Australia.

# RIRDC HORSE PROGRAM NEWS

## AVAILABLE SOON

### HEALTH AND SAFETY IN AUSTRALIAN HORSE RACING

*Researchers: C. Foote, A. McIntosh, P. V'Landys, K. Bulloch.*

Thoroughbred Racing in Australia is one of the most competitive sports of its type anywhere in the world. It can be dangerous for jockeys and track riders but there is currently a paucity of information on the incidence and type of injuries suffered by professional jockeys in Australia.

As the statistical data grow, a range of reports will be available to allow researchers, doctors and veterinarians to conduct analysis on the pattern of injury, with an aim of improving safety standard for the industry.

This research project had the following objectives:

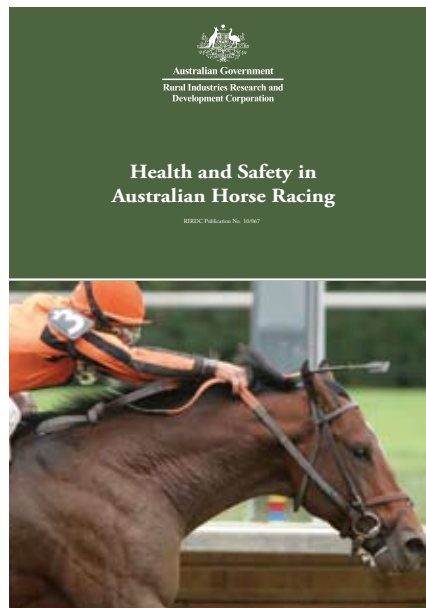
- To conduct a retrospective analysis of jockey injuries and risk factors associated with injuries
- To develop an accurate and extensive national database of injuries and incidents to persons (and horses) participating in the Australian Thoroughbred Racing Industry
- To evaluate jockey safety equipment and review new standards for the equipment.

Stewards' reports and insurance claim data were analysed to obtain an

accurate indication of the incidence and risk factors associated with horse falls in Thoroughbred racing. A total of 229 jockeys from across Australia were also surveyed on a variety of health and safety issues.

This report outlines the results of these investigations and recommendations on ways to improve safety standards in Australian racing. One exciting development is the possibility of a new jockey helmet which will provide far greater protection than currently available in any other helmet against severe trauma head injury.

*This report will be available for download (free) or purchase on the RIRDC website soon: [www.rirdc.com.au](http://www.rirdc.com.au)*



## NEW RESEARCH PROJECTS FROM RIRDC

### AN ADENOVIRAL VECTOR VACCINE AGAINST RHODOCOCCUS EQUI

*Researcher: Mary Barton  
Organisation: University of South Australia*

*R. equi* pneumonia causes enormous losses in the Thoroughbred and horse racing industries in Australia and currently there's no effective vaccine available anywhere in the world.

The disease is found world-wide and is recognised as one of the most significant respiratory pathogens in Thoroughbred foals. It has the potential to cause devastating losses on studs as it can be endemic on some farms.

This newly commissioned research project by RIRDC *An adenoviral vector vaccine against Rhodococcus equi* aims to develop a safe and effective vaccine against the disease in foals.

*R. equi* pneumonia kills approximately 10% of foals every year, with up to 50% of foals affected on some studs in the Hunter Valley region. It is a significant issue for the Thoroughbred studs in Australia and Thoroughbreds, Standardbreds and other breeds around the world.

The main benefits of the research will be economic and improved animal welfare – an effective vaccine would reduce the



*Stock image*

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impact of *R. equi* pneumonia on the Thoroughbred and racing industries by protecting foals from infection.

The project's objectives align with the objectives of the RIRDC horse program to reduce the incidence and impact of diseases and parasites.

## DEVELOPING TRAINING PROGRAMS TO PREVENT INJURY IN YOUNG RACEHORSES

*Researcher: Lisa Kidd*

*Organisation: University of Queensland*

Musculoskeletal injury\* in young racehorses caused by high intensity exercise during training and racing is a major problem facing the racing industry. This newly commissioned research project by RIRDC aims to directly tackle the most common causes of injury and breakdown in racehorses by identifying the effect of early training strategies on bone adaptation and fatigue damage. Musculoskeletal injuries cost the racing industry in terms of wastage and

financial losses sustained from time out of racing, reduced starts, medical costs and the retirement of horses.

Risks for musculoskeletal injury are very complex and determining if there are training options that would stimulate appropriate bone adaptation while minimising fatigue accumulation in bone would be a major step for the industry in developing training strategies to reduce the rate of injury in young racehorses.

Most musculoskeletal injuries in racehorses are caused by the repetitive loading imposed during training and racing. The number and frequency of high-strain loading strides affects the way bones and joints adapt to exercise. The study explores the training intensity level or loading pattern during early training that will induce a bone adaptive response that will allow horses to best resist fatigue injury.

It will use two groups of six previously untrained, related two-year old Standardbred or Thoroughbred cross horses in two different training

strategies. The two groups will either undertake intensive traditional or 'modified' training regimes.

Various measurement techniques will be used to determine the bone microdamage, modelling and remodelling response to early training under different loading patterns. These include CT scanning, radiology, bone histology, bone histomorphometry and gene expression.

These different loadings will be longer periods of fast work or shorter periods of fast work on a high speed treadmill with a documented exercise history including speed, distance, time and stride number.

The difference in distance covered in fastwork sessions seeks to determine if this difference impacts upon injuries sustained and adaptive response.

Similar research from other species would suggest that shorter periods of maximal loading will still induce adaptive response without causing bone fatigue injuries such as sore shins or stress fractures.

# INTERNATIONAL SYMPOSIUM ON GEOSPATIAL HEALTH

The 2007 outbreak of equine influenza in Australia lasted only 19 weeks, yet over 70 000 horses were infected across two states. Prior to this outbreak, Australia had never experienced equine influenza, leaving almost the whole horse population susceptible.

Epidemiological\* investigations into the 2007 equine influenza outbreak is an ongoing RIRDC funded project, contracted in 2008 in response to the Australian outbreak of the disease.

An output of this project will be presented at the International Symposium on Geospatial Health in August in Melbourne.

Dr Simon Firestone from the University of Sydney will present the research to global experts in the area of spatial epidemiology\*. This field involves investigating the complex interactions of emerging infectious diseases using geospatial statistics.

The paper being delivered is entitled *Combining social network analysis with spatial analysis of equine influenza epidemic contact-tracing data to describe early spread of the 2007 outbreak in Australia*.

The component of the research being presented describes the network of horse movements leading up to implementation of the national horse standstill, and aims to understand the mechanisms of spread of disease through the Australian horse population.

The research has the potential to inform the development of new technologies for conducting surveillance for infectious diseases in horses and other livestock industries.

The study aims to provide insights into how infectious diseases spread in naïve populations, especially under Australian conditions.

Social network analysis was conducted as a part of the study, combined with spatial analysis to describe aspects of the early spread based on contact-tracing data

of horse premises infected before any interventions were implemented.

It will help facilitate the control and eradication of such diseases that cause vast economic loss to the industry and impact on the health and welfare of Australian production and performance animals.



*Dr Simon Firestone*

\* see glossary on page 8

# CURRENT RIRDC HORSE PROJECTS

## *Maternal metabolic status and the occurrence of OCD in Thoroughbred foals*

Researcher: Wayne Bryden  
Organisation: University of Queensland

## *Investigation of the mechanism of insulin-induced laminitis in horses*

Researcher: Christopher Pollitt  
Organisation: University of Queensland

## *The Science of Horse Training: Implications for rider safety and horse welfare*

Researcher: Paul McGreevy  
Organisation: University of Sydney

## *In vitro optimisation of conditions for laryngeal reinnervation surgery*

Researcher: Eleanor Mackie  
Organisation: University of Melbourne

## *Computational modelling of in vivo contact stresses in the equine fetlock joint*

Researcher: Chris Whitton  
Organisation: University of Melbourne

## *Diagnosis and control of small strongyle parasites of horses*

Researcher: Nicholas Sangster  
Organisation: Charles Sturt University

## *Alfaxalone anaesthesia in horses: Potential for improved safety for horses*

Researcher: Helen Keates  
Organisation: University of Queensland

## *The synchronisation of oestrus and ovulation in the mare*

Researcher: Scott Norman  
Organisation: University of Queensland

## *Pathophysiological mechanisms in equine osteochondrosis*

Researcher: Eleanor Mackie  
Organisation: University of Queensland

## *Determining reliable excretion rates for therapeutic drugs in horses*

Researcher: Martin Sillence  
Organisation: Queensland University of Technology

## *Clostridium difficile-associated disease in horses*

Researcher: Thomas Riley  
Organisations: University of Western Australia

## *Intra-articular medication as risk factor for musculoskeletal injury*

Researcher: Chris Whitton  
Organisation: University of Melbourne

## *Modulation of gap junction expression in healing equine tendon*

Researcher: Janet Patterson-Kane  
Organisation: University of Queensland

## *Short term and future athletic performance of critically ill equine neonate*

Researcher: Jane Axon  
Organisation: Axon Veterinary Services

## *Treatment of placentitis in thoroughbred mares: efficacy of altrenogest*

Researcher: Joan Carrick  
Organisation: Scone Veterinary Hospital

## *Evaluation of the options for a Horse R&D Levy*

Researcher: Greg Martin  
Organisation: IDA Economics

## *Epidemiological investigations into the 2007 Equine Influenza outbreak*

Researcher: Navneet Dhand  
Organisation: University of Sydney

### SCHOLARSHIP TOP-UP

## *Epidemiological investigations into the 2007 Equine Influenza outbreak*

Researcher: Simon Firestone  
Organisation: University of Sydney

## *Alfaxalone anaesthesia in horses: Potential for improved safety for horses*

Researcher: Helen Keates  
Organisation: University of Queensland

## *Finite element analysis modelling of third metacarpal bone in vivo stresses*

Researcher: Chris Whitton  
Organisation: University of Melbourne

## *Improving the foot health of the domestic horse*

Researcher: Christopher Pollitt  
Organisation: University of Queensland

## *Jockey Essential Functions Information Pack for Treating Practitioners*

Researcher: Caron Jander  
Organisation: Australian Racing Board

## *Oncotic and Haemostatic Effects of a Modified Fluid Gelatin in Normal Horses*

Researcher: Darien Feary  
Organisation: The University of Sydney

## *Pathogenesis of distal limb breakdown injuries in Thoroughbred Racehorses*

Researcher: Chris Whitton  
Organisation: University of Melbourne

## *Respiratory disease and biomarkers in the foal*

Researcher: Garry Muscatello  
Organisation: The University of Sydney

## *Virus and horse specific risk factors for EHV1 neurological disease*

Researcher: Carol Hartley  
Organisation: University of Melbourne

## *Antimicrobial susceptibility patterns of bacterial isolates from horses*

Researcher: Tony Mogg  
Organisation: The University of Sydney

## *Investigation into the aetiology of Australian Stringhalt*

Researcher: Charles El-Hage  
Organisation: University of Melbourne

### SCHOLARSHIPS

Kellie Tinworth  
Charles Sturt University

Melody de Laat  
University of Queensland

Tiffany Dobbs  
University of Queensland

MORE INFORMATION ON RIRDC HORSE PROJECTS CAN BE FOUND AT [www.rirdc.gov.au](http://www.rirdc.gov.au)

## GLOSSARY

**Epidemiological:** A scientific discipline that studies the factors determining the causes, frequency, and distribution of diseases in a community or specified population

**Hyperinsulinemia:** The condition of having an excessively high level of insulin in the blood, usually due to excess production.

**Musculoskeletal injury:** refers to damage of muscular or skeletal systems, which is usually due to a strenuous activity

**Rattles:** caused by *Rhodococcus equi* – a robust soil organism widespread in

the environment – causes a persistent bacterial pneumonia in foals, and may become established as an endemic disease on some breeding farms.

**Spatial epidemiology:** the study of the spatial distribution of disease.

## CORRECTION

We wish to acknowledge the correct researcher of the project discussed on page 7 of the April 2010 edition, *The Development of Horse Embryonic Stem Cells*. It was written by Graham Jenkin from Monash University.

RIRDC EQUINE RESEARCH NEWS IS THE OFFICIAL NEWSLETTER OF THE RURAL INDUSTRIES RESEARCH AND DEVELOPMENT CORPORATION HORSE R&D COMMITTEE.

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