

Ross River Virus

A Cause of Chronic Fatigue Syndrome in Horses

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Over recent years, there have been numerous reports of a viral-like disease with an initial high temperature, joint pain and lameness, swelling in the lower limbs, loss of appetite and depression which develops into a chronic fatigue-like condition which can last for weeks or months. Affected horses are unable to exercise to their previous level and become 'flat' and tire easily when worked. Many of these horses appear to be infected during the summer months and are often located in areas with fresh water lakes and seaside lagoons or during a wet summer rainfall season. Some properties report recurring symptoms in horses each year, with many owners and trainers suspecting a virus being harboured in the soil from year to year.

It is now known, following surveys and blood testing for immune antibodies, that these symptoms which resemble the chronic fatigue of Ross River Virus in humans, are due to the same virus, with many horses when exhibit the above chronic fatigue-like signs, returning a positive antibody titre to the virus.

What is Ross River Virus?

Ross River Virus (RRV) is an arthropod (insect) borne virus (arbovirus) which can cause a number of neurological, musculoskeletal, behavioural and respiratory problems in horses. RRV was first identified in Narranderra and Hay in humans in 1928 and today is reported throughout most of Australia, Papua New Guinea and many islands in the South Pacific. It is a non-lethal disease, however infection can be quite debilitating and symptoms long lasting. In humans, 90% of cases report joint pain and arthritis and 50% develop chronic fatigue syndrome.

Because of its effects, infection of RRV in racing and performance horses can result in great economic loss, while in equestrian and pleasure horses, the often long lasting chronic fatigue-like symptoms are as equally frustrating to horse owners. As well as affecting horses, infection can also occur in humans, dogs, cats, marsupials and rodents, with kangaroos and wallabies being the most common carrier animals. Kangaroos, wallabies, and humans, as well as possums, flying foxes and birds, can act as natural reservoirs from season to season. It cannot be transmitted directly between them, but instead, RRV is transmitted by female mosquitoes biting the infected host and then inoculating the disease into another human or animal.

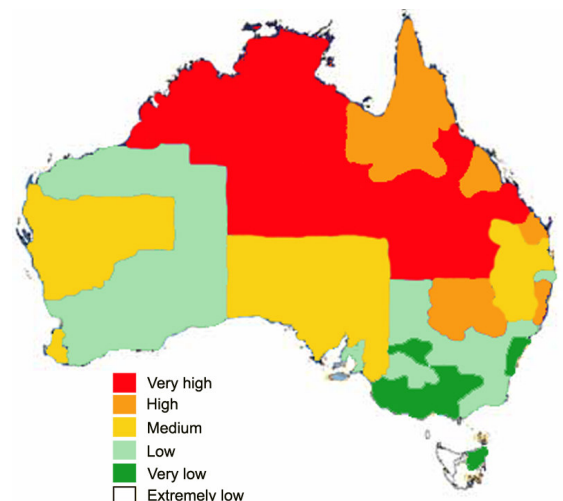
How is it spread?

RRV is transmitted only by several species of mosquitoes. These vector species (insects capable of transmitting a disease) vary with seasonal and environmental conditions in different regions of Australia. Some of the most common RRV vectors in Australia include *Culex annulirostris* (the major inland mosquito which breeds in fresh water habitats particularly in irrigated areas), *Ades camptorhynchus* (southern coastal Saltmarsh mosquito) and *Ades vigilac* (northern coastal Saltmarsh mosquito). In Australia, RRV outbreaks most commonly occur over the warmer months between September and May, peaking during January to March when mosquito populations are the greatest.

What climatic conditions favour infection?

The prevalence of RRV has been found to be highly associated with climatic conditions, with rainfall being the most important factor. Areas where RRV outbreaks have occurred have most commonly had high rainfall in the months leading up to the outbreak. Temperature and humidity have been found to be more variable, with outbreaks occurring in both tropical and temperate climates where temperatures range from as low as 6.4°C and as high as 40°C. While high rainfall creates optimum environment for mosquito breeding, the wide range of temperatures recorded during RRV outbreaks can be somewhat misleading. The optimum temperature for mosquitoes to breed is between 25°C -27°C. Although RRV outbreaks have been associated within temperatures and humidity over a broad range, mosquitoes tend to migrate to damp, warm conditions, such as around dams, rivers, tanks and drains where conditions are favourable for breeding. (Refer to the Distribution map of RRV in humans suggesting a warmer, higher rainfall, more northern and coastal incidence).

Risk of Ross River Virus in Australian Humans



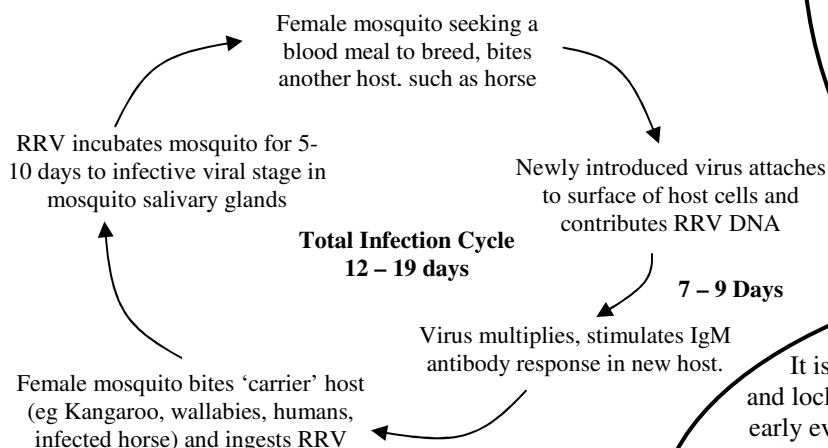
Common Signs in Horses

A wide range and severity of signs can be displayed by horses infected with RRV, with initial signs including fever, joint pain, swelling on the lower limbs and reluctance to move, followed by:

- Behavioural changes such as lethargy, more time spent lying down, as well as loss of appetite, weight loss, poor exercise performance or an inability to exercise with delayed recovery and symptoms of chronic fatigue.
- Respiratory signs including increased respiratory rate and a cough in early stages.
- Gastrointestinal problems including diarrhoea and spasmodic colic.
- Neurological signs including in-co-ordination (ataxia), low grade lameness and either reluctance to move, or restricted movement as if suffering chronic muscular and joint pain.
- Anaemia and lower than normal blood white cell counts, with low lymphocyte cell readings.

Viral Transmission / Virology

As RRV is an arbovirus which is transmitted between susceptible host species by mosquitoes. The process of transmission RRV occurs in the following way:



Did You Know That ...

Infective mosquitoes can harbour the virus and it is possible that at least one species can pass it onto the next generation of mosquitoes through eggs which are resistant to drying under drought conditions. They hatch to 'wrigglers' in water after rainfall and the new mosquito can already be infected without taking the virus with a blood meal to breed.

Diagnosis

During the active acute phase of RRV, the horse's primary response to infection is the production of IgM antibodies, which occurs within 7-9 days post infection. IgM antibodies continue to rise until 2-3 weeks before rapidly declining. As IgM antibodies begin to decline, IgG rises and overrides IgM making it the dominant antibody. Testing for IgM and IgG antibodies in the blood is the only way to diagnose a horse with RRV. The IgG antibody can be identified in the blood samples of affected horses for up to 18 months.

HANDY HINT

1 Early Signs of RRV Infection

The earliest sign is a rise in body temperature above 39 degrees for 4-5 days whilst the virus multiplies in the blood and body cells. The horse often becomes depressed with a reduced ability to exercise and a loss of appetite. After the first week following infection, fluctuations with intermittently high temperatures and recurrent bouts of fever and lassitude are often observed, which distinguishes RRV from the more common EHV-1 'stable' virus respiratory infection. Many horses develop soft, cold fluid swellings in the lower limbs and occasionally under the stomach and throat. Some develop swollen and painful lymph nodes under the jaw. After the first 7-10 days following initial infection, other signs including joint swelling and tenderness, with stiffness in movement, reluctance to move and sore muscles are usually noted and some horses appear to be 'tied up' in the muscles during exercise, rather than after exercise. Blood tests fail to indicate an elevation in muscle cell enzymes normally associated with the 'tying up' syndrome.

2

HANDY HINT

Blood Antibody Screening to Determine Time of Infection

The presence and level of IgM antibodies either alone or in combination with IgG in a blood test, can provide an indication of time of infection, while the identification of IgG antibodies alone is frequently used as an indicator of prior infection with RRV. If you suspect that your horse has been suffering from RRV in its early stages, it is best to take 2 blood samples 2 weeks apart, to not only assist with the detection of RRV, but also to help to more precisely identify the time of infection. This will often coincide with the start of the early symptoms, often associated with a high population of mosquitoes 2-3 weeks after summer rainfall.

HANDY HINT

3 Manage Turn-out Times to Minimise Mosquitoes

It is helpful to restrict turn-out times to mid morning to mid afternoon and lock your horse up in the late afternoon prior to the sunset period, the early evening and after dark when mosquito activity is high to reduce the chance of being bitten by a RRV carrying mosquito. If it is your own property, you can install fine flyscreen covers around stable areas to reduce the chance of mosquitoes gaining access to your horses when they are stabled during these high risk periods. It is also a good idea to block off all other openings around the stable block, including the edges of sliding doors. It is also helpful to install an electric mosquito 'zapper' on the walls of the stable aisle or veranda to help control mosquito numbers. A mosquito trap containing an attractant chemical is also recommended to be installed near to the stables to attract mosquitoes away from the body heat of horses.

Did You Know That ...

If you are situated in an area with a high risk of RRV transmission, it is important to take measures to reduce exposure to yourself and children. Mosquitoes are most common in the early evening and overnight during the warm summer months, so ensure that you are covered and apply an insect repellent when outdoors and when sleeping. Flywire screens are also recommended on bedrooms and a mosquito net that covers the bed area at night.

Prevention

To assist with the prevention of RRV infection in horses, it is important to adopt stringent mosquito control measures particularly after rain when the conditions are favourable for mosquito breeding. Mosquitoes are more active in the morning and evening so it is important to ensure that your horse is well covered, with properly fitting rugs from head to tail during these times.

Some mosquitoes can bite through thin cotton rugs, so that it is best to provide a thicker cotton sheet with neck rug and hood with ear pieces to help provide more complete protection over common target areas for female mosquitoes. A mesh fly veil with ear covers can be used in the evening as an alternative to a hood. When considering an agistment property or stable/yard housing for your horse, try to keep away from areas known to be populated with mosquitoes and natural hosts, such as kangaroos and wallabies. Heavily populated areas include coastal areas and wetlands with higher humidity where conditions favour mosquito breeding. Properties with stable blocks or yards away from any wetlands or damp and steamy areas are less likely to be a high risk location but mosquitoes can fly to areas neighbouring wetlands.

Other Therapies

Alternative therapies are also commonly suggested as preventative measures. Supplementing the ration with herbs, such as garlic and marigold, are thought to make the horse's blood less palatable to biting mosquitoes. However, avoid supplementing with more than 20g garlic per day/500kg horse, as studies have shown that higher doses of garlic can result in anaemia due to formation of Heinz body particles in red blood cells which significantly reduces their lifespan in the blood. It has also been suggested that mosquitoes are attracted to horses consuming sweet feeds and molasses in the diet, whilst other observations suggest that adding apple cider vinegar (50-75 mL in the evening feed) in place of molasses, may help minimise attraction by mosquitoes. However, none of these measures are totally protective. Citronella, lavender, rosemary and lemongrass are all thought to be natural mosquito repellents. A natural repellent spray which is believed to keep biting insects away can be made from combining the oils of citronella, lavender, paraffin and eucalyptus with distilled water.

Controlling Mosquitos

The use of tested and approved insect repellents, such as Flygon®, are more protective against mosquitoes for an extended time (Refer to Handy Hint 5). Although kangaroos and wallabies are the natural host animal for RRV, it is a waste of time fencing the perimeter of a property to control their access to paddocks as infected mosquitoes can fly from nearby bushy, wetland areas where wallabies colonise. Moving to an area free of kangaroos and wallabies and high populations of mosquitoes may be a last resort if RRV becomes a seasonal problem on a horse property.

Treatment & Recovery

Once RRV has been suspected by the clinical symptoms of depression, joint pain and lower limb swelling, progressing to chronic fatigue-like signs, or confirmed in the horse by detection of IgM and/or IgG antibodies in serology tests, treatment should be commenced. Unfortunately, as is the case in humans, there is no drug-based medication available which is able to suppress or eradicate the virus from the horse's body. Antibiotics and anti-inflammatory agents, including corticosteroids, can be of benefit to help make the horse more comfortable, but they cannot actually destroy the virus. Treatment with non-steroidal anti-inflammatory drugs (NSAID's), such as 'bute' and Finadyne® can be given to relieve symptoms of pain and swellings. The horse should be rested and stress should be limited, as this can cause a relapse in severity and symptoms of the disease. Most affected horses make a full recovery within 18 months. Usually, by this time, permanent immunity will develop so that the horse cannot be reinfected with the virus throughout the rest of its life. (Refer to Handy Hint 6).

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HANDY HINT

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Purchase an Under-Belly Protective Rug

A special rug designed with an under-belly covering to virtually seal and protect the under-body areas from mosquitoes is available in the UK. It is called a Boett Rug®. They can be purchased on the Internet or from distributors in Australia. When combined with stabling overnight and windows and doors fitted with fine mesh fly wire, the risk is greatly reduced.

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HANDY HINT

Use a Long Acting Mosquito Repellent

Lightly spray your horse in the late afternoon, especially its lower limbs if you are covering the body with a rug, with a long acting, waterproof insect repellent, such as Flygon®. Flygon is based on natural pyrethrins and citronella oil which results in a low irritant, 24-36 hour long lasting repellent action. Many alcohol based repellents only last for 2-3 hours before evaporating and losing their activity, whilst Flygon® maintains its repellent activity for up to 24 hours between applications.

HANDY HINT

6

Supplement with Immune Nutrients

It may be of benefit to give a daily supplement of **Kohnke's Own Activ-8** containing immune active nutrients, such as organic zinc, organic selenium and high doses of vitamin A and Vitamin E, as well as other supportive nutrient co-factors, to help correct low or inadequate intake from pasture or hard feeds to help maintain the immune response in horses with early symptoms. A daily supplement of Activ-8 given for 3 weeks may help maintain optimum immune activity during the critical first 3 weeks of immune challenge to the RRV virus in the blood and tissues. Field trials indicate that Activ-8 can help maintain the appetite and general well-being in horses with suspected RRV infection and antibody titre to the virus. It is important that horses maintain their appetite during the incubation stage of the disease.