

Myxomatosis

Fact sheet

Introductory statement

Myxomatosis was introduced into Australia in 1950 as a biological control agent for the European rabbit, *Oryctolagus cuniculus*. The rabbit is one of Australia's most significant vertebrate pests, with an estimated economic impact of \$200 million p.a. (McLeod 2004). Rabbits cause significant environmental, agricultural and pastoral damage.

Aetiology

Myxomatosis is caused by a poxvirus known as Myxoma virus (MV), a member of the genus *Leporipoxvirus*, family *Poxviridae*. Viruses of this genus generally cause localized fibromas in their natural hosts.

Natural hosts

MV affects a number of species of rabbits and hares to a varying degree. Cottontail rabbits (*Sylvilagus brasiliensis* and *S. bachmani*.) are the natural hosts of MV and are only mildly affected, developing only localized skin tumours (cutaneous fibromas); however in the European rabbit, MV causes a severe generalized disease with high mortality (OIE n.d., Carter and Wise 2006). The European brown hare (*Lepus capensis*), also found in Australia is rarely affected (Harcourt-Brown & Whitwell 2003).

World distribution

MV was first identified in Uruguay, South America in 1898. It was deliberately introduced into Australia in 1950 and France in 1952 where it spread across continental Europe and reached the United Kingdom. It is now found throughout Europe, North and South America and Australia. It does not occur in Asia, Southern Africa or New Zealand (OIE n.d.).

Occurrences in Australia

MV occurs throughout the rabbit's distribution in Australia.

Epidemiology

Myxomatosis is a highly infectious disease. It is transmitted by mosquitoes and rabbit fleas and can also be transmitted via direct contact as virus is shed in discharges. The incubation period can vary depending on the inoculation route, virus dose and virulence of the strain. Initial formation of a lump at the site of infection occurs within 2-4 days and more generalized signs of myxomatosis may appear between 6-14 days after infection. Replication of the virus occurs at the inoculation site within the dermis and epidermis. In European rabbits the virus then spreads to the regional lymph node where it replicates to high titres. Skin lesions develop within 4–5 days. Viral replication in the regional lymph node results in cell associated viraemia and generalised infection with dissemination to the skin away from the inoculation site, spleen, mucosal surfaces (e.g. conjunctiva, upper respiratory tract), other lymph nodes, testes, liver and lungs. By day 9 the eyelids are swollen and secondary conjunctivitis develops (often with semipurulent ocular discharge). (Harcourt-Brown 2002, Blood et al. 2007). Death often results in 2–5 weeks. Some Australian strains of MV may cause few or no clinical signs of typical myxomatosis in domestic rabbits but cause death within 9-10 days of infection.

After its initial release in Australia, MV had a mortality rate of 99.8% (CSIRO 2011); however, through natural selection for resistant rabbits, probably less than 50% of rabbits that become infected now succumb to the disease.

Clinical signs

Clinical signs include swelling of the eyelids, ears and face. Also, a profuse, purulent ocular and nasal discharge, subcutaneous lumps 1–2 cm diameter, especially on the head, and swelling of the genitalia (Blood et al. 2007). Pyrexia, anorexia, lethargy and depression are also observed. Respiratory difficulty is often present in acute infections with head and neck extended and laboured noisy breathing.

Diagnosis

Diagnosis can be confirmed by necropsy and further confirmation can be made by isolation, negative-staining electron microscopy, polymerase chain reaction (PCR) or serologically through the use of agar gel immunodiffusion (AGID), complex fixation (CF), indirect fluorescent antibody (IFA) and ELISA.

Pathology

Haemorrhages of the organs and body cavity may be visible but are not typical. Eyes will have swollen conjunctivae with a crusting mucopurulent discharge around the eyes and nose. Lymph nodes will be enlarged, oedematous and often haemorrhagic. The spleen may be swollen and necrosis of the liver may be present.

Differential diagnoses

Pasteurellosis, bacterial or viral keratoconjunctivitis

Laboratory diagnostic specimens

A portion of lesion (especially eyelids) is excised with scissors. Myxoma are separated from the epidermis and superficial dermis. This is washed with phosphate buffered saline (PBS) with antibiotics and homogenised with ground glass at a dilution rate of 1 g tissue/4.5–9.0 ml of PBS. Cells are disrupted by two freeze–thaw

cycles, or by ultrasonication to liberate virions and viral antigens. This suspension is centrifuged for 5–10 minutes at 1500 g. The supernatant fluid is used for the tests (OIE 2008).

Treatment

There is no known treatment for myxomatosis. It is generally considered that rabbits presenting with myxomatosis should be euthanased on humane grounds unless the disease is very mild. Intensive nursing care, aggressive fluid therapy and supportive feeding may assist in rabbit survival until an improved immune response is seen, but this is rare (Saunders & Davies 2005).

Prevention and control

Vaccines have been developed for myxomatosis, however they are not available and are illegal to use in Australia. Infected enclosures may be cleaned with 10% bleach, 10% NaOH or 1-1.4% formalin, and screening should be used to keep out insect vectors. Sick rabbits should be isolated to prevent the disease from spreading in domestic colonies.

Research

Research was conducted into a vaccine for use in Australia during 2001–2005. Live attenuated virus vaccines with 3 inactivated virulence genes provided very good protection with few side-effects and wild rabbit trials showed the vaccine had very limited potential to transmit. Funding for this research ran out in 2005 and no further work has been carried out (CSIRO 2011).

Human health implications

The virus only affects rabbits and poses no public health risk (OIE).

http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/Disease_cards/MYXO-EN.pdf

Conclusions

Myxomatosis is still an important biological control agent for the European rabbit in Australia. Even though the more attenuated strains are now present in Australia, the virus still kills many rabbits at no financial cost.

References and other information

Blood DC, Studdert VP, CC Gay (2007) Saunders Comprehensive Veterinary Dictionary, Third Edition. Saunders Elsevier, Missouri.

CSIRO (2011) Fact Sheet: Myxomatosis and rabbits in Australia today
<http://www.csiro.au/resources/Myxomatosis.html> Accessed 13 May 2011.

Harcourt-Brown F (2002) Textbook of Rabbit Medicine. Reed Educational and Professional Publishing Ltd, Oxford, UK.

Harcourt-Brown F & Whitwell K (2003) "Rabbits and hares" In: BSAVA Manual of Wildlife Casualties, Mullineaux, E., Best, R., Cooper, J.E. (Editors), British Small Animal Veterinary Association pp 109-122.

Harkness JE and Wagner JE (1995) The Biology and Medicine of Rabbits and Rodents Fourth Edition. Williams & Wilkins, USA.

OIE (n.d.) General disease information sheets: Myxomatosis. Paris.

OIE (2008) Terrestrial Manual. Lagomorpha: Myxomatosis. pp 937–946. Paris

Saunders RA, and Davies RR (2005) Notes on Rabbit Internal Medicine. Blackwell Publishing Ltd, Oxford.

Acknowledgements

The following people have had input into this document: Dr Tarnya Cox, NSW Department of Primary Industries, Vertebrate Pest Research Unit. Dr Peter Kerr, Ecosystem Sciences, CSIRO.

Updated: 17 May 2011

To provide feedback on this fact sheet

Wildlife Health Australia would be very grateful for any feedback on this fact sheet. Please provide detailed comments or suggestions to admin@wildlifehealthaustralia.com.au. We would also like to hear from you if you have a particular area of expertise and would like to produce a fact sheet (or sheets) for the network (or update current sheets). A small amount of funding is available to facilitate this.

Disclaimer

This fact sheet is managed by Wildlife Health Australia for information purposes only. Information contained in it is drawn from a variety of sources external to Wildlife Health Australia. Although reasonable care was taken in its preparation, Wildlife Health Australia does not guarantee or warrant the accuracy, reliability, completeness, or currency of the information or its usefulness in achieving any purpose. It should not be relied on in place of professional veterinary consultation. To the fullest extent permitted by law, Wildlife Health Australia will not be liable for any loss, damage, cost or expense incurred in or arising by reason of any person relying on information in this fact sheet. Persons should accordingly make and rely on their own assessments and enquiries to verify the accuracy of the information provided.



Find out more at www.wildlifehealthaustralia.com.au
email admin@wildlifehealthaustralia.com.au
or call +61 2 9960 6333