Rabbit Hemorrhagic Disease Virus (RHDV/RHDV2)

A shelter reaches out for advice on how to protect their rabbits from the calicivirus that causes Rabbit Hemorrhagic Disease, a reportable foreign animal disease.

Question:

I am a veterinarian at a municipal shelter that mostly cares for dogs and cats, but we also usually have at least a few rabbits and other small animals. We have been hearing about this deadly rabbit virus (Rabbit Hemorrhagic Disease Virus) and although it isn’t yet in our state, we’d like to know how best to prepare in case it does arrive here. Any advice?

Answer:

Thank you so much for reaching out. This is a significant disease on many levels and every shelter should prepare for the potential that it could arrive in their area. Rabbit Hemorrhagic Disease Virus has three subtypes with two of main concern. The first, RHDV1, was first discovered in China in 1984 where it resulted in the deaths of 14 million domestic rabbits in 9 months. RHDV2 is responsible for the current outbreaks in wild and domestic rabbits throughout much of the southwestern United States and is rapidly spreading.

Biology of RHDV2:

RHDV2 belongs to the calicivirus family. These are non-enveloped viruses, which means they lack the fatty outer covering that makes them susceptible to simple detergents like soap. Hence, RHDV is similar to parvo and feline calicivirus in terms of hardiness and resistance to disinfection.

Clinical signs of infection vary from none (asymptomatic carrier) to sudden death. Affected rabbits may display inappetence, lethargy, respiratory distress, bloody nasal discharge, and/or evidence of liver failure.

The incubation period is three to nine days, with a reported mortality rate between five and 70+%. RHDV2 was first discovered in France in 2010 and while early mortality rates were on the lower end, more recent outbreaks have had a much higher death rate, with 100% of susceptible rabbits dying in some cases. This suggests the virus may be evolving into a highly pathogenic calicivirus of significant concern.

Transmission:

RHDV2 is extremely contagious and easily transmitted with only a few viral particles required to infect a rabbit. It can be transmitted via direct contact, bodily fluids, fur, fomites (inanimate objects like food bowls, toys, bedding), rabbit carcasses/meat, food, and mechanical vectors like insects, birds or other animals. The virus is resistant to freezing and can survive in the environment for months, remaining as a source of infection for both wild and domestic rabbits.

Diagnosis:

A presumptive diagnosis can be made based on clinical signs and the infection pattern within a population. A definitive diagnosis is most often obtained using reverse transcription polymerase chain reaction (RT-PCR). This testing typically uses organ tissue such as liver or spleen from a deceased rabbit. Antibody testing is available to determine if a rabbit has been exposed (or vaccinated), however both types of testing are currently only performed at the Foreign Animal Disease Diagnostic Laboratory (FADDL) in Plum Island, New York. RHDV is a reportable foreign animal disease, so even without a definitive diagnosis, any suspicious case should be reported to your state veterinarian. They can provide you with further guidance on next steps.

Prevention:
There are vaccines that can provide some protection against RHDV2, but they are not yet commercially available in North America. Veterinarians may apply for an importation permit through the USDA but it can be a lengthy process; refer to this how-to guide from a veterinarian who successfully imported vaccines in Washington state.

There are several important considerations regarding the use of vaccines. First, vaccination does not induce complete sterile immunity. Vaccinated rabbits are provided with some protection and have a better chance of survival than unvaccinated rabbits, but some can still become infected, infect others, and die. Secondly, manufacturing of the two vaccines available for importation requires that laboratory rabbits be infected and euthanized, so vaccines should only be purchased in the number that will be used. Lastly, a vaccinated rabbit will test positive on antibody testing so vaccination status is critical information to have should antibody testing be performed. Some states may require proof of vaccination during an outbreak investigation.

**Strict biosecurity and sanitation protocols are the best tools we have for protecting our shelter rabbits.** As mentioned above, RHDV is a non-enveloped virus, which means it is extremely hardy in the environment and that only certain disinfectants used at the proper concentration can inactivate it. Cleaning protocols effective against parvovirus and feline calicivirus will be effective against RHDV. Read our Sanitation in Animal Shelters guide for more information, including a link to a Table of Disinfectant Products.

Managing the flow of people and animals in the shelter is another critical step. It is best to keep the rabbit population in the shelter as low as possible, especially in an area with endemic RHDV or a current outbreak. Utilize foster, foster-to-adopt, adoption promotions, and rehoming tools (e.g. www.home-home.org) to move rabbits through the shelter system as safely and efficiently as possible. Shelters must be mindful that people (staff, volunteers, public) interacting with rabbits in the shelter could transmit RHDV to or from other rabbits they may encounter (including wild rabbits in the case of wildlife rehabilitation centers). Special handling precautions/personal protective equipment (PPE) are necessary depending on whether there is a current outbreak in the area.

Other control measures include:
- Practice hand hygiene before and after handling rabbits or their supplies
- Keep insects away from animal and feed areas
- Do not collect wild browse for rabbits (potential for contamination from wild rabbits)
- Keep rabbits housed indoors

Please visit the RHDV section of the House Rabbit Society’s website for more information, including a detailed RHDV protocol for animal shelters and rescue facilities.

**Management:**

What are the ramifications if a shelter rabbit is diagnosed with RHDV2? This is a foreign animal disease and is reportable to your state veterinarian and OIE (World Organisation for Animal Health). Next steps will be dependent on guidance from your state veterinarian but often, depopulation of any rabbits in the facility followed by a rigorous cleaning of all rabbit areas/equipment and a period of 90 days without rabbits in the facility is required. Contact tracing from the infected rabbit would be completed to identify any potentially exposed rabbits that may have moved on from the shelter via adoption or foster.

If you encounter any suspicious rabbit deaths, the animal(s) must be handled with caution; contact your state veterinarian for handling recommendations. Guidance will typically include wearing personal protective equipment (gown, gloves, shoe covers), double bagging the animal and disinfecting the outside of the bag with a disinfectant effective against nonenveloped viruses (Rescue™ (accelerated hydrogen peroxide) at 1:16 dilution for 5 minutes, Trifectant® for 10 minutes, bleach at 1:10 dilution on a previously cleaned surface for 10 minutes). If you are directed to freeze or refrigerate the animal, choose a cooler that is not frequently used in order to reduce the chance of fomite transmission.

Rabbit Hemorrhagic Disease Virus is absolutely something that all shelters need to be aware of right
now. Although the U.S. has seen RHDV2 in years past, this is the first time that outbreaks in wild rabbits have been documented here, increasing the risk for greater spread throughout the country. As with many infectious diseases, keeping the animal population in the shelter as low as possible is one of the best tools available to minimize risk of transmission. Now is a great time for a “Clear the Shelters” rabbit adoption promotion!

Best of luck with your preparations,

Erica Schumacher, DVM
Outreach Veterinarian
Shelter Medicine Program
University of Wisconsin – School of Veterinary Medicine
www.uwsheltermedicine.com
www.facebook.com/UWSHelterMedicine

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