

Rabbit Hemorrhagic Disease

Introduction/Definition

Rabbit Hemorrhagic Disease (RHD) is a lethal disease caused by a calicivirus. This virus has been present in Europe and Australia for decades, but until recently was not found in North America. There are two primary strains of the Rabbit Hemorrhagic Disease Virus (RHDV): Rabbit hemorrhagic disease virus type 1 (RHDV or RHDV1) and rabbit hemorrhagic disease virus type 2 (RHDV2). The rabbit hemorrhagic disease virus type 1 emerged in the 1970s or 1980s and became endemic in Europe and Australia. The rabbit hemorrhagic disease virus type 2 emerged around 2010 in Europe. In March of 2020, an outbreak of RHDV2 began in New Mexico and has spread rapidly across the United States and into Mexico and Canada. This outbreak differs from prior outbreaks of RHDV, which primarily affects only the European rabbit, in that it also affects wild cottontail rabbits and hares. This disease only affects rabbits and is not zoonotic. Currently, RHDV2 is considered a foreign animal disease in the United States and confirmed positive cases are reportable to USDA-APHIS or your state veterinarian. Likely, RHDV2 will become endemic to the United States.



organic materials. It is easily spread among rabbits, either by direct contact or by contaminated fomites such as hands, dishes, towels, and cages. The virus can also be spread by biting insects such as mosquitoes, fleas, ticks, and biting flies and can survive up to 9 days on insects once the virus is picked up. Since the virus is present in wild rabbit populations, it can be tracked into a home on shoes or other objects that are exposed to contaminated dirt or through insects. While indoor-only rabbits are less likely to get RHD than rabbits that go outdoors, reports from Europe show that even indoor-only rabbits can contract the disease and die from it. The incubation period of RHDV2 is thought to be between 3 and 9 days. Rabbits surviving a natural infection with RHDV2 can shed the virus for at least 30 days, and possibly up to 105 days (3.5 months). Like many other viruses, surviving rabbits are likely to become reinfected as their antibody protection wanes and should be vaccinated yearly.

Prevention and Vaccination:

Vaccines against RHDV2 are currently available in the United States, Canada, and Europe, and include:

1. Eravac
 - Killed, inactivated vaccine
2. Filavac VHD K C+V
 - Inactivated vaccine
 - Protects against RHDV and RHDV2
3. Nobivac Myxo-RHD PLUS
 - Live recombinant vector, bivalent vaccine
 - Protects against RHDV, RHDV2, and myxomatosis
4. Medgene RHDV2
 - Inactivated or killed recombinant subunit protein vaccine

Vaccination against RHDV2 is effective for 9-12 months depending on the vaccine, and boosters are needed to maintain immunity. All of the vaccinations available are administered subcutaneously, are highly effective, and the vaccinations cannot cause a rabbit to become infected with or become carriers of the virus. Most rabbits show no adverse effects from the vaccine, but a few will display temporary lethargy, reduced appetite, or limping after either vaccine administration. A local reaction in the form of a subcutaneous nodule can occur after the vaccination, and then typically resolves on its own with no treatment within 2 months. More severe reactions, such as anaphylaxis and death, are rare.

The Medgene vaccination can be administered as early as 4 weeks of age, and the European vaccinations can be administered between 4 and 10 weeks of age depending on the vaccine. The Medgene vaccination requires a booster 21 days after the initial dose, and then yearly thereafter. The European vaccinations are

QUICK FACTS



- Rabbit Hemorrhagic Disease (RHD) is a lethal disease that has spread worldwide.
- There are two strains of the Rabbit Hemorrhagic Disease Virus, RHDV1 and RHDV2
- RHDV2 is likely to be endemic to the United States.
- It is easily spread among rabbits, either by direct contact or by contaminated surfaces and objects.
- There are several vaccinations available in Europe and a vaccine in the United States has been granted emergency use authorization.

Clinical Signs

Clinical signs of RHD vary depending on how quickly the disease progresses, and the strain. Reports estimate that up to 75% of unvaccinated domestic rabbits that contract this disease will die from it. The RHDV2 strain has been shown to be less lethal compared to the original RHDV. Clinical signs that may be observed include:

1. **Peracute:** Rabbits are often found dead with no prior signs.
2. **Acute:** Other rabbits develop fever, lethargy, loss of appetite, breathing difficulties, blue-colored lips, and bleeding from body cavities.
3. **Chronic:** Chronically affected rabbits can show signs of liver failure such as jaundice and neurological signs.

Disease Transmission:

The RHDV2 virus is shed in the feces and other bodily fluids of affected rabbits. The virus is very stable in the environment and can persist for up to 3 months in carcasses, fabric, and other

effective from 7 days to 3 weeks after the single-dose administration and the Medgene vaccination is protective 14 days after the second booster (35 days after the first dose).

Most of the European vaccinations are available in single and multiple-dose vials, while Medgene is currently only available in a 10-dose vial which must be utilized within hours of opening it. While single-dose vials of this vaccine are planned, they are not expected to be available before the end of 2023 due to supply chain constraints.

It is currently unknown if rabbits previously vaccinated with the European vaccinations will need to have both dosages of the Medgene vaccination. Because of this, it is recommended to administer both the initial and booster vaccination of Medgene 21 days later to these rabbits to ensure protection.

Other Methods of Prevention

To prevent possible exposure of your rabbits to RHDV2, even if vaccinated, we recommend you take the following precautions, especially if you are in a high-risk area:

1. Monitor the spread of RHDV2 via state and federal resources.
2. Reduce or eliminate outdoor playtime.
3. When allowed outdoors, keeping your rabbits away from wild rabbits is vital. If your rabbits are housed or play outdoors, make sure they are on a rabbit-safe monthly flea preventative such as Advantage® II or Revolution®. *Never use Frontline® on rabbits as it causes a fatal neurologic reaction.*
4. Minimize mosquito and fly exposure risks by keeping rabbits indoors during warm/humid seasons as much as possible by using window and door screens and/or by draping fly netting over your rabbit's enclosure
5. If you are in contact with rabbits outside of your household, change clothes when you return, and make sure to thoroughly wash and disinfect your hands. Do not wear possibly contaminated shoes in the house, especially if you live in areas where wild rabbits live and/or you have visited a place where rabbits are kept.
 - To disinfect shoes that may have been contaminated, clean the shoes of any organic material, then place the shoes in a bath containing one of the below disinfectants. The shoes must be in contact with the disinfectant for the required contact time, during which time the disinfectant must remain wet. Be sure to read the label instructions for contact time for your disinfectant.
 - Bleach diluted 1:10 in water (2300 ppm of sodium hypochlorite) if used within 24 hours after dilution.
 - Virkon S™
 - Rescue™
 - The above disinfectants can also be used to disinfect surfaces and other potentially contaminated objects.
6. Don't expose your rabbit to other, unvaccinated rabbits, and minimize translocation of your rabbit as much as possible. For example, learn how to groom your rabbit at home to avoid taking them to other locations.
7. Eliminate exposure to contaminated foods:
 - DON'T feed foraged plants or grasses from areas affected by the outbreak.
 - DO feed pre-packaged hay or store-purchased hay from feed store and store for at least 4 months before feeding to your rabbit.
 - DO wash all greens for at least 2 minutes, changing the water several times (do not use soap or disinfectant on greens and vegetables).
- DO feed greenhouse-grown or indoor-grown greens at home
- DO peel vegetables with an outer skin such as carrots and zucchini.

8. If you volunteer or work at a shelter or veterinary clinic in an area with an outbreak, have special clothes and shoes that you wear only at that location. You may want to wear shoe covers or plastic bags over your shoes, secured with a rubber band. When you leave the shelter, remove the covers, and dispose of them before you get into your car, making sure not to touch the outside of the bag. Launder clothes when you get home before interacting with your rabbit and follow shoe disinfecting instructions below.
9. If you see dead or dying rabbits outdoors, do not touch them, but call your state's fish and wildlife agency, or the local agriculture agency.

For multi-pet households:

1. Keep cats indoors when possible.
2. Use a monthly flea treatment on cats and dogs.
3. Walk dogs on a leash to prevent interaction with wild rabbits.
4. Wash dog paws off when coming inside.
5. Designate separate areas in your household for rabbits, away from other pets.
6. Don't feed cats, dogs, or ferrets raw or freeze-dried rabbit meat.
7. If you bring a new rabbit into your home, quarantine it from other rabbits for at least 9 days and have it vaccinated at the earliest opportunity.

If your rabbit is showing signs of illness and you are concerned that it might have been exposed to RHDV2, you should contact a veterinarian experienced in exotic companion mammals immediately, isolate your rabbit from conspecifics, ensure adequate hygiene measures after handling your rabbit, and disinfect the cages and environment using disinfectants active against RHDV2 (see above).

Treatment

Treatment is currently limited to supportive care only and there is no known cure for RHDV2. Supportive care may include intravenous fluids, assisted feeding, and pain management.

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References:

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