Emerging Risk Notice

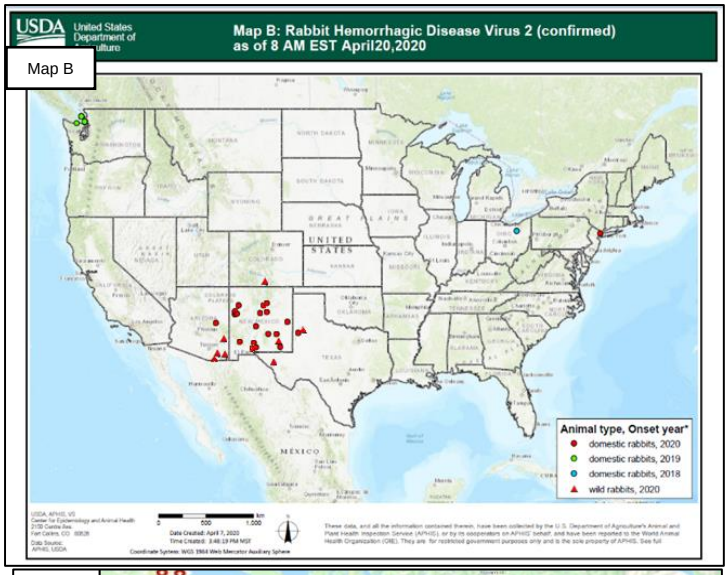
April 2020

Rabbit Hemorrhagic Disease Virus, Serotype 2

Event Summary

- On March 24, 2020, RHDV2 in pet rabbits in New Mexico was confirmed at the USDA Animal and Plant Health Inspection Service (APHIS) National Veterinary Services Laboratory (NVSL) Foreign Animal Disease Diagnostic Laboratory (FADDL). Since this report, additional detections on non-commercial domestic rabbit premises and wild rabbits have been confirmed in multiple states, including Arizona, Texas and Colorado; this investigation is ongoing.[24, 27-29]
- Additional follow-up on reports of native wild rabbit die-offs in central and southern New Mexico, Arizona, Texas and Colorado occurred in April. To date, New Mexico Department of Game and Fish submissions of samples from a wild black-tailed jackrabbit (genus: *Lepus)* and wild cottontail rabbits (genus: *Sylvilagus)* have tested positive for RHDV2, the first detections of this virus in wild rabbits in the United States. Additional RHDV2 detections in wild rabbits have occurred in Arizona, Texas and Colorado, in Black-tailed Jackrabbits, Eastern Cottontail rabbits and Desert Cottontail rabbits. [24, 25, 27, 28, 29]
- On March 6, 2020, RHDV2 was detected in 11 rabbits in a New York City veterinary clinic that died over a period of a week beginning February 18th The animals were being housed as non-commercial patients, boarders, and rescues. Currently, there are no known links to outbreak events in previous RHDV2 detections in Washington State.[21, 23]
- Between July and December 2019, the United States (U.S.) detected RHDV2 in pet and feral European rabbits (*Oryctolagus cuniculus*) in Washington State. The virus was identified in the San Juan Islands and at an animal sanctuary in Clallam County, as well as in free-ranging feral domestic rabbits. Whole genome sequencing indicates the RHDV2 virus is very similar to the 2018 British Columbia, Canada strain. [8, 9, 19, 20, 22]
- In Vancouver, Canada, in April 2019, RHDV2 was confirmed in four feral rabbits in Parksville in an area where there was an RHDV2 outbreak in

Map A: Global detections of Rabbit Hemorrhagic Disease Virus serotype 2 (RHDV2)(red markers) and RHDV-untyped (green marker) occurring from 2010 through 2020, as reported to the World Animal Health Organization (OIE).



Map C: United States: Locations of July 2019 RHDV2 detections in pet and feral rabbits on the San Juan islands and near Port Angeles, Clallam County, Washington (**red circles around purple dots with white center dots**)[8]
Canada: Locations of April and June 2019 RHDV2 detections **(purple dots with white center dots)** on Vancouver Island and in Metro-Vancouver in British Columbia, Canada.[1, 7]
Red dots with white center dots represent the 2018 RHDV2 outbreaks in British Columbia, Canada, with onset dates from Mid-February to April 7, 2018.[4]

2018.[1] In June 2019, RHDV2 was confirmed in dead pet rabbits in a downtown apartment building.[2] (Map B). Canada continues to provide public awareness in the rabbit-hobbyist communities.[2, 3, 17]

- In September 2018, RHDV2 was detected in a pet rabbit in Medina County, Ohio.[5] The strain was closely related to the 2018 RHDV2 strain in Canada.[6]
- Initial detections of this strain of RHDV2 in Canada occurred from February to April 2018 in feral rabbits on Vancouver Island, British Columbia, just north of Washington State.[2] Genetic analysis reveals the strain most closely matches (96.2 percent identity) an RHDV2 isolate from a rabbit farm in São Jorge in Azores Islands, in 2011.[3, 4]
- Prior to these detections, the first occurrence of RHDV2 in North America was in Québec, Canada, in August 2016. (Map A). The 2016 RHDV2 strain is different from the 2018 RHDV2 strain. Sources of introduction are unknown.[7]
- The very first detections of RHDV2 occurred in France in 2010 and since has spread around the world. [Map A]

Key Points

- Outbreaks of Rabbit Hemorrhagic Disease Virus, serotype 2 (RHDV2) are ongoing in the United States. Between July 2019 and April 2020, Rabbit Hemorrhagic Disease Virus, serotype 2 (RHDV2) has been detected in rabbits (*Oryctolagus cuniculus*) in Washington, New York City, New Mexico, Arizona, Texas and Colorado.[25-29] [see maps A, B and C].
- Concurrent to the events in privately owned rabbits, mortality has been reported in wild rabbits and hares in the region since March 1. Reports of wild rabbit deaths in southern and eastern New Mexico, Arizona, Texas and Colorado.[24-29]
- State Animal Health Officials (SAHO) and the United States Department of Agriculture (USDA) are working together to respond to and conduct epidemiological investigations. Activities include conducting trace-ins and –outs, testing, quarantines, and ensuring appropriate cleaning and disinfection.
- Outreach to local veterinarians, rabbit breeders, pet owners and the community increases awareness of the situation and provides information including recommendations for a 90 day fallow period before introducing new rabbits.[11]
- All those who care for or come into contact with domestic rabbits, whether pets or commercial animals, rescues or those who encounter wild rabbits, must practice enhanced biosecurity.[11]
- Biosecurity and risk mitigation measures include excluding visitors from rabbitries, fencing out wild rabbits, limiting new animal introductions, and separating new additions for at least one week prior to allowing contact with others.[10, 11]
- No RHDV strains are a threat to human health.[10]
- USDA APHIS FAD PReP Rabbit Hemorrhagic Disease: 2013[4] provides responders and stakeholders a common understanding of the disease agent.
- All RHDVs are reportable to the World Organization for Animal Health (OIE).[10]

Concerns for U.S. Animal Health

- The risk of additional RHDV2 outbreaks is high in the United States as a result of the potential for additional introductions from Canada as well as further spread in Washington, New York and New Mexico.
- For most of the RHDV2 detections in the U.S., the introduction pathways have not been identified. Transboundary movements of domestic pet and feral rabbits (domestic rabbits released in the wild) present a risk of transmission between Canada and the United States and between the affected States.
- The U.S. rabbit industry is estimated to be worth between $2.2 billion and $2.3 billion, of which 80 to 90 percent are represented by the value of pet supplies and care of over 6.7 million pet rabbits (primarily domestic European rabbits) in approximately 2.9 million households. Impacts would be felt in the pet rabbit industry; 4-H, National FFA

Organization, and other hobby groups; exhibitions; laboratories; and the meat, pelt, and hunting sectors.[2]

- To date, there have been no significant trade impacts.

Epidemiology

- Rabbit hemorrhagic disease (RHD) is caused by a non-enveloped, single-stranded RNA virus in the family: Calicivirus; genus: Lagovirus, with three recognized pathogenic groups: RHDV (aka RHDVa), RHDV1 (considered a subtype of the classic RHDV), and RHDV2 [aka RHDVb], which could be considered a distinct serotype.[10, 11, 12]
- The incubation period for RHDV2 is 3 to 9 days.[26]
- Subacute infection is generally mild and may cause affected rabbits to survive minor clinical symptoms and develop antibodies.[11]
- Clinical signs of peracute infection are sudden collapse and death with no other signs. Acute infection may exhibit nervous and respiratory signs, lethargy, anorexia, epistaxis, observable hemorrhages in the eye, blood in feces, and icteric skin coloration. Death typically occurs in 1-3 days. Necropsy of the affected rabbits will reveal hepatic necrosis and hemorrhage.[11]
- Domestic rabbits typically experience peracute or acute disease, but chronic illness is possible in small percentage of infected animals.[11]
- Rabbits can become infected with RHD at any age, but young rabbits (less than 50 days old) experience only subclinical disease. [11]
- RHDV2 has been detected in Europe, Africa, Australia, New Zealand and the Americas. [Map A]
- RHDV2 has a wider host range than RHDV, which only affects domestic European rabbits. RHDV2 has also affected some hares in Italian outbreaks: the Sardinian cape hare and the Italian hare.[4, 13, 14] Eastern cottontail rabbits—the most common rabbit species in North America, including areas in the Northwest corner of the contiguous U.S. are susceptible to RHDV2, but not RHDV[1, 15]
- There are no clear epidemiological links between the RHDV2 outbreaks in the U.S. However, the Washington outbreak is in close proximity of a Canadian RHDV2 outbreak in British Columbia that also involved feral domestic rabbits.

Transmission

- Rabbit hemorrhagic disease (RHD) is highly contagious. Transmission routes include direct contact with live or dead infected rabbits, meat, or fur; mechanical vectors (e.g., wild carnivores and raptors); or by contaminated fomites (e.g., chilled or frozen meat, food, bedding and water) through oral, respiratory, or conjunctival routes and skin trauma. The virus is present in all secretions and excretions.[10]
- Viable virus has been found in decaying tissue after 90 days outdoors, potentially serving as a reservoir.[11]
- Exposures may occur in animal shelters, wildlife rescue centers and in the wild, if releases occur. Any of these transmission routes may be a possible pathway for disease introduction to and spread in the United States.[10, 11]

Diagnostic Testing

- The USDA APHIS National Veterinary Diagnostics Services Laboratories' Foreign Animal Disease Diagnostic Laboratory performs testing for both RHD virus antigen (ELISA and rt PCR) and RHD antibodies.[4, 10]
- Samples to collect include fresh liver, lung, spleen and whole blood. Formalin fixed liver, spleen and other organs can be submitted for pathologic evaluation.[4, 10]

Treatment

- There is currently no cure for rabbits infected with RHDV2 or any of the fatal RHDV viruses.[10, 11]
- Diagnosis by an accredited veterinarian is recommended for rabbits showing compatible

clinical signs of RHDV infection after exposure to other domestic or wild rabbits, or after exposure to a human who has recently handled other sick or dead domestic or wild rabbits.[10, 11]

- Sick rabbits should be isolated immediately to prevent contact with other rabbits.[10, 11]

Prevention

- Strict biosecurity measures are essential to prevent introduction of the virus to rabbitries, laboratories, wildlife shelters, and private residences, including sanitation and disinfection, the maintenance of closed colonies or isolating new rabbits entering a rabbitry.[10]
- Inactivation of the virus occurs with use of 10 percent bleach solution. [10, 18]
- Release of domestic rabbits into the wild at any time is a high risk practice and is not advised.[10, 11]
- Inactivated RHDV2 vaccines exist, which are currently registered in Spain and France and used in some RHDV2-infected countries. These vaccines are not licensed in the U.S., although may be authorized by USDA for use under specific situations.[10, 11, 17]
- The virus survives freezing.[10]

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