Emerging Risk Notice

October 2019

Rabbit Hemorrhagic Disease Virus, Serotype 2

Key Points

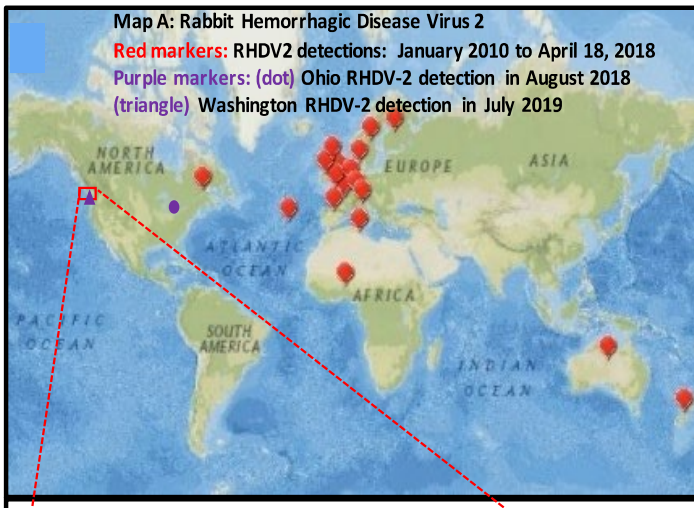
- In July, 2019, the United States (U.S.) detected Rabbit Hemorrhagic Disease Virus, serotype 2 (RHDV2) in a pet rabbit on Orcas Island, San Juan County, Washington.[9] In addition, three feral European rabbits (*Oryctolagus cuniculus*) found dead on Orcas Island in the area of the index premises were confirmed RHDV2 positive on July 25, 2019, as reported by the Washington Department of Agriculture.[8] (purple triangles: Map A; Map B)

- The U.S. detection followed detections in Vancouver, Canada:
  - On April 10, 2019, RHDV2 was confirmed in four feral rabbits in Parksville[1] (purple circle around red star on Map B) in an area where Canada experienced RHDV2 outbreaks in 2018 (red stars: Map B).
  - On June 21, 2019, RHDV2 was confirmed in dead pet rabbits in a downtown apartment building[2] (purple empty circle on Map B).

- Canada responded to the latest detections by increasing public awareness in the rabbit-hobbyist communities. In addition, a special localized licensed RHDV2 vaccination campaign for domestic rabbits began in the vicinity of the detections.

- 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 the Washington State border (red stars on Map B; USDA RHDV2 Notice: June 2018[2]). In September 2018: RHDV2 was detected in a pet rabbit in Ohio (purple dot: Map A).[5] The strain was closely related to the 2018 RHDV2 strain in Canada.[6]

- Prior to these detections, the first occurrence of RHDV2 in North America was in Québec, Canada, in August 2016.[3] (red marker in Canada: Map A) The 2016 RHDV2 strain is different from the 2018 strain.



Map B. Locations of April and June 2019 Rabbit Hemorrhagic Disease Virus 2 (RHDV2) outbreaks (purple circles) on Vancouver Island and in Metro-Vancouver in British Columbia, Canada.[1, 7]
July 2019 RHDV2 detections in a domestic pet rabbit and feral rabbits on Orcas Island, Washington (purple triangle).[8]
Red stars show 2018 RHDV2 outbreaks in British Columbia, Canada, with onset dates from mid-February to April 7, 2018.[4]

- None of the RHDVs are a threat to humans.

- Whole genome sequencing indicates the 2019 RHDV2 virus is very similar to the 2018 British Columbia, Canada strain and most closely matches (96.2 percent identity) an RHDV2 isolate from a rabbit farm in São Jorge in Azores Islands, in 2011.[4] Sources of introduction are unknown.

- 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 US Animal Health

- The risk of additional RHDV2 introductions to the United States continues to be high due to the proximity of the 2019 RHDV2 Canadian detections within 20 miles of the U.S. border, as well as potential further spread from the possible presence of infected feral rabbits on Orcas Island.
- Transboundary movements of domestic pet and feral (domestic rabbits released in the wild) rabbits present a risk of transmission between Canada and the United 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, Future Farmers of America (FFA), and other hobby groups; exhibitions; laboratories; and the meat, pelt, and hunting sectors.[2]

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 1 to 5 days.[10] Typical clinical signs are sudden collapse and death. In some instances, there are blood-tinged nostrils, but typically no other obvious signs are observed. Necropsy of the affected rabbits will reveal hepatic necrosis and hemorrhage.
- RHDV2 seems to have 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 RHDV1.[15]
- Neurological or respiratory signs and severe jaundice may be noted, and with longer survival, signs may include dullness and anorexia. Disease caused by RHDV2 may also infect rabbits as young as 15 days of age.[10, 15, 16]
- RHDV2 has been detected in Europe, Africa, Australia, New Zealand and the Americas [markers on Map A].

Transmission

- 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.
- 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 from Canada.

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. Additionally, 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.
- 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.
- Sick rabbits should be isolated immediately to prevent contact with other rabbits.

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]
- Release of domestic rabbits into the wild at any time is a high risk practice and is not advised.
- 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. RHDV2 vaccines are only recommended where virus is circulating in feral and wild rabbits.[10, 11, 17]
- Vaccines for RHDV1/RHDVa, and RHDV2 are poorly cross-protective.[10]
- The virus survives freezing; inactivation is by 10 percent bleach solution.[10, 18]

Prepared by: Sherrilyn Wainwright, DVM, MPH
USDA APHIS VS CEAH Risk Identification Team

For further information contact: Dana Cole, DVM, PhD
Risk Identification & Risk Assessment Director.
USDA APHIS VS CEAH
E-mail: Dana.J.Cole@usda.gov

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