



RABBIT BIOSECURITY & RHD INFORMATION

Maricopa County 4-H Small
Stock Advisory Committee

RABBIT BIOSECURITY & RHD INFORMATION — OUTLINE

Here is what this presentation covers:

- Definitions of Biological Threat and Biosecurity
- Information about Biosecurity and Quarantine
- Information about Rabbit Hemorrhagic Disease (RHD) and variants RHDV1, RHDV2
 - What it is and What it Does
 - Disinfection Options for RHD
 - How RHD is Spread
 - Protection Against RHD
 - Known Areas of RHD Infection in the U.S.A.
 - What to do if you Suspect an Infection
 - How to Bag a Carcass or Contaminated Material
- Examples and Scenarios – What Should you do?
- How Can I Help Save Rabbits
- Summary
- Additional Sites/Resources/References

BIOLOGICAL THREAT — DEFINITION

A Biological Threat is a threat carried out by biological agents

- Biological Agent definition from Disasterassistance.gov: “Biological agents are bacteria, viruses, and toxins that can disable or kill people, animals, and crops.”
- The biological agent we will focus on in this presentation is the Rabbit Hemorrhagic Disease virus (“RHD”)
 - The first variation of RHD is known as “RHDV1”
 - The second variation of RHD is known as “RHDV2”

BIOSECURITY — DEFINITION

Biosecurity can be defined as:

- (1) the methods that are used to stop a disease or infection from spreading from one person, animal, or place to others;
- (2) actions that are taken to prevent damage from **biological threats**

The biosecurity in this presentation is specific to **RHD**.

RABBIT BIOSECURITY — IMPORTANCE

Why is Biosecurity Important to rabbits and us?

- Biosecurity is important because it can keep our rabbits and native species of rabbits and hares safe from RHD.
- RHD only affects rabbits and hares, and does not pose a threat to humans or other animals.
- Maintaining biosecurity in our rabbitries will help keep RHD from spreading to native species and to other rabbitries.
- If we fail to maintain biosecurity, we can put our rabbits, others' rabbits, and native species at risk.
 - It may be difficult for native species to survive if their numbers are greatly reduced by disease
 - If native species are greatly reduced in numbers, the natural food chain will be disrupted, and predators will starve and/or seek out other food sources (e.g., farmer/rancher/pet animals).

QUARANTINE — DEFINITION

Dictionary.com defines Quarantine (in part) as:

- a strict isolation imposed to prevent the spread of disease
- a period, originally 40 days, of detention or isolation imposed upon ships, persons, animals, or plants on arrival at a port or place, when suspected of carrying some infectious or contagious disease.

The quarantine information in this presentation is specific to **RHD**.

BIOSECURITY — GENERAL QUARANTINE INFO

How do you quarantine animals?

- A quarantine area should be a separate physical location where no quarantined animals can come into physical contact with animals who are not quarantined.
- Sanitize your hands or wear latex or nitrile gloves before caring for rabbits, in between groups or areas of rabbits, and sanitize your hands after caring for rabbits.
- Quarantined animals must have their own items (e.g., feed bins and scoops)
- Quarantined animals are cared for LAST.
 - This makes it less likely to spread disease or parasites to healthy animals.

What are some examples of quarantine containers for animals?

- For rabbits, a quarantine cage like a regular cage is best, but it can be a different style of cage, a dog kennel, or even a large plastic tote with air circulation holes cut out.
- If you quarantine inside your house, you can keep a close watch on animals.

Plan a quarantine area and have it ready before you need it.

BIOSECURITY — GENERAL QUARANTINE INFO (CONTINUED)

How long should you quarantine animals?

- The length of suggested quarantine should be long enough to cover the **incubation period** of disease.
 - The **incubation period** is the time in which an animal is infected with a disease, but does not show symptoms.
 - Most incubation periods are under 21 days, so if you quarantine an animal for 21-30 days without symptoms appearing, you can feel confident that the animal is free of disease.
- Keep records of when a rabbit entered quarantine and any symptoms observed (e.g., lethargy, not eating, etc.)
 - Record the date with any observed symptoms
 - These will be important if the rabbit becomes sick
- After the quarantine is over, the rabbit should get a thorough exam before being returned to the herd, and quarantine items should be disinfected for the next use.

INFORMATION ABOUT RABBIT HEMORRHAGIC DISEASE (RHD)

What is it and what does it do?

Rabbit Hemorrhagic Disease (RHD, collectively, or RHDV1 or RHDV2 specifically) is a highly contagious disease caused by a calicivirus that affects rabbits. In April 2020, RHDV2 had been shown to kill black-tailed jackrabbits and cottontail rabbits in New Mexico and Arizona. RHDV1 was first seen in China in 1984 from rabbits imported from Germany. It has spread to many other countries. RHDV2 has replaced RHDV1 as the main virus strain that is found in the U.S.A. today.

RHD is endemic (regularly found and very common) in many places, including Europe, Australia, China, Cuba, and New Zealand.

Symptoms may include:

- Sudden death (this is the most common symptom)
- Loss of appetite
- Lethargy
- High fever
- Spasms
- Bleeding from nose, mouth, and rectum

Sudden, unexplained rabbit deaths are suspicious and should be reported to the State Veterinarian as possible cases of RHD. Rabbitries infected with RHD typically have multiple rabbits die over a few days' time.

INFORMATION ABOUT RHD (CONTINUED)

- Incubation period is very short and death usually occurs 12-26 hours after the onset of fever
 - RHDV1: 1-3 days after exposure before symptoms appear
 - RHDV2: 3-9 days after exposure before symptoms appear
- The death rate is very high with RHDV1 (close to 100%) but lower (5% to 70%) with RHDV2.
- Survivors are carriers and shed the virus for at least 42 days, and perhaps longer.
- The virus remains viable for 105 days in its dried state on cloth at room temperature.
- It has been proven to survive heat of 122° F for 1 hour and survives freeze/thaw cycles.
- The virus remains viable for 22-35 days at 72° F
- Viable virus has been found in decaying tissue after 90 days outdoors
- The virus is stable at pH 4.5-10.5, survives pH 3.0, but is inactivated at a pH greater than 12
- There is no known cure for RHDV1/RHDV2.
- A French vaccine, Filavac, was used in Canada following an outbreak (2018-2019), and was recently available in Washington state due to an outbreak there.

WHAT DISINFECTION OPTIONS ARE THERE FOR RHD?

RHD is tough. It's a calicivirus which lacks the envelope that most viruses have. Some typical disinfection methods which inactivate other viruses do not work for RHD. Scrub any organic material (shavings, feces, etc.) from surfaces before using a disinfectant. Keep surface wet with disinfectant for **10 minutes**.

Here is what does work:

- 1% solution of Sodium hydroxide (also known as lye or caustic soda)
- Formalin (1-2%) – a solution of formaldehyde and water
- 1.0–1.4% formaldehyde
- 0.2–0.5% beta-propiolactone at 4° C (39° F)
- Chlorine dioxide at 10 ppm concentration

Other suggested disinfectants:

- Sodium hypochlorite (1:10 dilution household bleach)
- Substituted phenolics such as 2% One-stroke Environ® (Vestal Lab Inc., St. Louis, MO)
- Potassium peroxymonosulfate (e.g., 1% Virkon-S by DuPont)

NOTE: Quaternary ammonium compounds, chloroform, and trypsin do not affect RHD.

HOW IS RHD SPREAD?

Here are some methods in which RHD can be spread:

- A rabbit coming into contact with inanimate objects contaminated by the virus (via fomites).
 - Examples: clothing, shoes, feed crocks, water bottles, carrying cages, hay, flooring, etc.
- Direct contact of a rabbit with an infected rabbit or with the feces or urine of an infected rabbit.
- Contact with rabbit products such as fur, meat or wool from infected rabbits.
 - Contact with imported packaged frozen meat from China that contained RHDV1 caused an outbreak in Mexico years ago.
 - Dead rabbit carcasses can contain the live RHDV2 virus for up to 3 months.
 - If a carnivore eats the dead carcass, the virus can pass through the carnivore and remain active in its feces.
- Insects, scavengers, birds, and rodents are known to spread the virus by acting as indirect hosts.
 - They can transport the disease from an infected rabbit or surface to a healthy rabbit or other surface.
- Humans, dogs, and cats can spread the virus to rabbits if they have been in contact with infected rabbits or in contact with objects contaminated by the virus, including feces or fur from an infected rabbit.
 - Visitors to a fair can spread RHDV1 /RHDV2 by touching an infected rabbit or surface, and then touching other rabbits.

PROTECTION AGAINST RHD

How to Protect Your Rabbits

- House your rabbits indoors or in an enclosed environment.
 - Rabbits who live or exercise outdoors (e.g., outdoor enclosures or colonies) are more at risk for contracting this disease.
 - If housed outside, you must keep all insects, birds, and bird poop out of your rabbits' enclosure
 - Do not feed anything that grows outside because it could be contaminated
- Wash your hands thoroughly and use hand sanitizer with 60% or higher alcohol content before handling your rabbits, particularly when you come home from places where other rabbits may have been, or where people who have been in contact with rabbits may have been.
 - Examples: Feed stores, pet stores, fairgrounds, animal shelters, veterinarian's office, areas with wild rabbits, etc.
- Change your clothes and wash your hands after handling or coming in contact with rabbits.
 - RHDV1/RHDV2 is killed by 140°F heat, so wash these clothes twice in hot water and dry in a dryer before wearing them around rabbits.
 - Most household water heaters are set at 120°F to prevent scalds.
 - You may want to have some special clothes (e.g., a show coat) and shoes that you wear only around your bunny barn.
 - Adopt a “no outside shoes in the house” policy, or keep your rabbits off the floor in high traffic areas. (The virus is very sticky, and can be carried on shoes.)

PROTECTION AGAINST RHD (CONTINUED)

Additional Protections:

- Know your sources of hay and feed and if they are near areas of any outbreaks.
 - Store hay and feed in sealed bins, where no vermin can get to them.
- Use municipal water supply instead of shallow well or groundwater.
- Minimize insects (especially biting insects) in your rabbitry by installing window and door screens.
 - Flies, mosquitoes, and other insects can carry the virus on them from infected animals or carcasses.
- Hand Sanitizer with at least 60% alcohol inactivates the virus from skin.
 - Use hand sanitizer in between caring for healthy and quarantine animals, and in between cages when cleaning.
- Ultraviolet (UV) light also inactivates the virus (time of exposure depends on the strength of UV).
 - Strong commercially available UV machines can inactivate the virus quickly.
 - More information about this method is available online, though units can be expensive.

KNOWN AREAS OF RHD INFECTION IN THE U.S.A.

Areas where RHDV2 cases have been confirmed recently:

- **Washington** (July 2019 – January 2020)
 - Feral/non-feral rabbits in several areas
 - Tested positive for RHDV2
 - One veterinarian imported and administered the French-made vaccine, Filavac, to healthy rabbits
- **New York** (February 2020)
 - Rabbits housed at an avian and exotics veterinary clinic in Manhattan (patients, boarders, rescues)
 - Tested positive for RHDV2
- **New Mexico** (March – present 2020)
 - RHDV2 has been confirmed in 11 counties in New Mexico
 - Confirmed cases in native Black-tailed Jackrabbits, native Desert cottontail rabbits, and domestic (European) rabbits
- **Arizona** (April 2020)
 - RHDV2 has been confirmed in Douglas and North Eastern AZ (Cochise and Greenlee Counties) in Feral/non-feral rabbits
- **Texas** (April 2020)
 - RHDV2 has been confirmed in Hockley, El Paso, Hudspeth, Brewster, Terrell, Lubbock and Pecos Counties
- **Mexico** (April 2020)
 - RHDV2 has been confirmed in Chihuahua and Sonora
- **Colorado** (April 2020)
 - RHDV2 has been confirmed in Costilla County

Reduce travel to known areas where RHD is present, and take precautions if you must travel to those areas.

COULD IT BE RHD? WHAT DO I DO?

What to do if RHDV1/RHDV2 is Suspected

- Report unexplained and suspicious rabbit deaths, especially when they occur in clusters of several rabbits dying in a short period of time, to the State Veterinarian (see below).
 - If the rabbit deaths follow the pattern for RHDV1 or RHDV2, the State Veterinarian will provide testing more effectively and much less expensively than a regular veterinarian's office.
 - Do not touch wild rabbits that are sick or dead; note the location (geo-coordinates are best) and contact the State Vet.
- The following slide details how to wrap and store a carcass for analysis.
- Reporting a suspected disease may be embarrassing, but it does not mean that you were careless or that your rabbitry is not kept clean.
- It is of vital importance that reporting take place to ensure an incident does not become a widespread outbreak, with additional lives lost.
 - In some countries, this disease is endemic; reporting incidents will help keep our country from becoming endemic.

Arizona State Veterinarian: Dr. Peter Mundschenk, email: pmundschenk@azda.gov, Phone: (602) 542-4293

HOW DO I BAG A CARCASS OR CONTAMINATED MATERIAL?

These instructions from Pamela Alley, Director of the Rabbit Industry Council, will enable you to bag items without spreading contamination:

- You will need two or three bags and two pairs of latex or nitrile gloves. Put on both pairs of gloves.
 - Turn the first bag partially or even completely inside out, grasp the animal THROUGH the barrier of the bag, and lift high enough so the rest of the bag will not touch the ground if possible. (Like grabbing a pillow through the end of a pillowcase.)
 - DO NOT let the outside of the bag touch the ground or the animal AT ALL; you want all the contamination on the inner side, and preferably toward the bottom of the bag.
 - Wrap bag around, contaminated side in with the animal, and close tightly without it touching the ground or anything else.
 - Bleach or Virkon the outside of the first bag thoroughly (wet contact for **ten minutes**), then invert the second bag, grasp the closure of the first bag and wrap the second bag around the first and close tightly. Disinfect again.
 - The first pair of gloves gets disinfected right along with the outside of the first bag, then you take them off and place them into the depths of the second bag.
 - Use the second bag as described, then disinfect the second glove layer, then finish bagging, disinfect gloves along with the second bag, and either bag in a sealed baggie or add another bag around it all and include your disinfected gloves.
 - Disinfect your hands and anything else the bags touched, let the outer bag dry after its disinfection time.
 - Store or dispose of carcass or material as instructed (storage is usually in a refrigerator, not a freezer).

RABBIT BIOSECURITY FOR RHD – EXAMPLES AND SCENARIOS

The following slides contain examples of biosecurity required by RHD and scenarios related to biosecurity.

- Remember, RHD requires more biosecurity than many other viruses.
- Read the scenarios and think about what you would do before reading the responses.
- Responses are not all-inclusive – depending on your rabbit set-up, you may need to take different or additional steps.

BIOSECURITY — EXAMPLES

Examples of biosecurity include:

- Inspecting animals at a fair's registration table before allowing them to be shown
- Quarantine of new animals that were purchased, or animals returning from a show
- Soaking shoe soles in a Clorox solution for 10 minutes (9 parts water, 1 part Clorox)
- Washing “rabbit” clothes twice in hot water immediately after handling rabbits, and drying in a hot clothes dryer
- Installing fine-mesh screens in rabbitry windows, doorway, and any other openings
- Using hand sanitizer before and after petting someone else's rabbit
- Moving rabbits away from ground/outdoor living spaces so feral and native rabbits, birds/bird droppings, flying and biting insects cannot come in contact with them

BIOSECURITY — SCENARIO 1

Scenario 1: Angie's outdoor rabbit hutch and exercise area is on the ground, has chicken wire for sides, and a wire top that wild birds perch over. The wild birds' droppings make a mess inside the hutch and exercise area.

What are the potential ways in which RHD can be brought to Angie's rabbits?

- The hutch and exercise area is on the ground outside. It's possible that wild rabbits or other animals could carry the virus and come into contact with Angie's rabbits.
 - Although RHD only affects rabbits, other animals and insects can act as carriers.
- Chicken wire has holes that are too large. Animals can poke their noses into the hutch, and biting insects and other insects can get inside.
- Wild birds can carry RHD and pass it on to the rabbits.
- Vegetation that grows through to the inside of the hutch/exercise area may carry RHD.

BIOSECURITY — SCENARIO 1 (CONTINUED)

Scenario 1: Angie's outdoor rabbit hutch and exercise area is on the ground, has chicken wire for sides, and a wire top that wild birds perch over. The wild birds' droppings make a mess inside the hutch and exercise area.

What if two of Angie's rabbits become ill or die suddenly?

- If the rabbits follow the pattern for RHD, Angie should contact the State Veterinarian's Office and report the deaths.
 - Angie can contact Pamela Alley (Rabbit Industry Council, Oroville, CA) first, if she's not sure about contacting the State Vet.
 - Pamela Alley can be reached by: RNRQ@att.net or 530-403-0468
- If Angie has rabbits in other hutches or areas, she will want to quarantine the infected hutch.
- Angie should write down any interactions with other rabbit owners, feed stores, or encounters with deceased rabbits within the past 10-14 days.

BIOSECURITY — SCENARIO 2

Scenario 2: Alejandro showed one of his ten rabbits at the fair, and is returning it to his rabbit barn after the show.

What can Alejandro do to reduce the risk of disease for his nine other rabbits?

- Unless you only have one animal, any time your animal is exposed to other animals, it's best to quarantine it when it returns home.
 - RHDV2 has an incubation period of 9 days, though most rabbit folks quarantine from 14-21 days.
- Quarantine protocol should maintain a physical separation between quarantined and other rabbits.
 - When returning from a fair or show, change your shoes and clothes before caring for non-quarantined rabbits.
 - Care for the quarantined rabbit last.
 - The quarantined rabbit should have its own water and food sources and crocks/bottle.
 - The quarantined rabbit should have a separate container and scoop for feed.

BIOSECURITY — SCENARIO 2 (CONTINUED)

Scenario 2: Alejandro showed one of his ten rabbits at the fair, and is returning it to his rabbit barn after the show.

In addition to quarantine, what else can Alejandro do to keep his rabbits safe?

- Alejandro must have a plan for disinfecting items that may come into contact with RHD
 - Many disinfectants that work on other viruses do not work on RHD
 - He should refer to the list of disinfectants and methods for inactivating RHD (included in this document)
- He must also consider all the ways that the virus could be carried into his rabbitry, then plan to counteract them
- He needs to find out where his feed comes from, and make sure it's not from an area which has had an outbreak of RHD
 - If it's the prior year's cutting of hay, and there's a current outbreak, the older hay will be alright because it was cut before the virus was in the field
 - Pelletized feed is heated during processing. There is some debate, but pellets are generally thought to be safe, so the main threat is hay and greens.

BIOSECURITY — SCENARIO 3

Scenario 3: Mike takes his dogs for a walk in a nearby field, and notices them nudging something. He sees it's a dead wild rabbit, and there are others nearby.

Mike has his rabbits in a small barn. What should Mike do?

- Mike must get his dogs away from the deceased rabbits.
 - If the wild rabbits died from RHD, the dogs will carry the virus on their feet and nose – anything that came in contact.
 - He should keep them away from his rabbitry, since they could carry the virus (and are not easy to disinfect!).
 - Mike should scrub the dogs well with soap and water, as this is the only treatment available to help remove the virus.
 - He should refer to the list of disinfectants and methods for inactivating RHD (included in this document).
- Mike should get the GPS coordinates of the spot, if possible, to notify the State Veterinarian.
 - If unable to get GPS coordinates, Mike should give the location as precisely as possible.
- Mike must disinfect his shoes, clothing, hands – anything that touched the ground and the dogs.
 - If shoes or clothes are muddy, the mud must be scrubbed off before disinfecting them
 - Mike should wash his clothing in hot water twice, dry in a hot clothes dryer
 - Mike should change into clean clothes and shower before visiting his rabbitry
- If Mike hasn't assessed biosecurity for this rabbit barn, he must do so now

HOW CAN I HELP SAVE RABBITS?

To Protect Rabbits, Educate Yourself and Others.

- Consider following this Facebook page for updated, accurate information: [RHDV Information Page](#)
- Read information shared on the following sites, and make copies of information to share:
 - The American Rabbit Breeders Association (ARBA) website: <https://arba.net>
 - The Center for Food Security & Public Health and the Institute for International Cooperation in Animal Biologics: [Rabbit Hemorrhagic Disease](#)
 - World Organization for Animal Health: [Rabbit Haemorrhagic Disease](#)
 - USDA's Animal and Plant Health Inspection Service (APHIS): [Rabbit Hemorrhagic Disease – Standard Operating Procedures: 1. Overview of Etiology and Ecology](#)
 - Frances Harcourt-Brown's website: <https://www.harcourt-brown.co.uk/owners/frequently-asked-questions/FAQRHD>
 - House Rabbit Society: <https://rabbit.org>
- Share information with club members, veterinarians, shelters, and pet stores that sell rabbits.
 - Veterinarians receive updates from the State Veterinarian, but shelters and pet stores do not

HOW CAN I HELP SAVE RABBITS? (CONTINUED)

To Protect Rabbits, Educate Yourself and Others:

- Help others learn about RHD and set up biosecurity plans.
- Minimize insects in your rabbit area (especially biting insects).
- Know where your hay and feed come from – try not to feed your rabbits anything that came from an area dealing with an outbreak.
- Share information with club members, veterinarians, shelters, and pet stores that sell rabbits.
- Anyone with what they feel is a potential case may contact Pamela Alley at the Rabbit Industry Council, Oroville, CA. RNRQ@att.net, 530-403-0468
 - Pamela can help to go through what happened, and determine if it needs to be reported, or if other steps (like a full necropsy) are needed first.

SUMMARY

You have read through a lot of information, much of which may be new to you. It may help to re-read this information in the near future. Here are some additional notes:

- The current outbreak information will change as time goes on, so stay connected (see Facebook page info on the next slide) to remain up-to-date.
- At the time of publication, a group of veterinarians have requested the RHD vaccine. There is a possibility that one can be licensed and produced in the U.S.A. Again, stay connected to hear when and if one becomes available.
- Take this virus seriously, and move forward with a PLAN instead of panic.
- Educate yourself and others, and share what you have learned. There are many who are completely unaware of this virus and the threat it poses.
- Be vigilant, and continue to enjoy your rabbits.

SPECIAL THANKS TO THESE PERSONS AND REFERENCES FOR THEIR WEALTH OF KNOWLEDGE!

- RHDV Information Page, and North Americans RHDV2 Group (Facebook Page, and Facebook Group Admins and Members, especially JI Bonen and Pamela Alley)
- Frances Harcourt-Brown (<https://www.harcourt-brown.co.uk/owners/frequently-asked-questions/FAQRHD>)
- The American Rabbit Breeders Association (ARBA) (www.arba.net)
- USDA's Animal and Plant Health Inspection Service (APHIS) (<https://www.aphis.usda.gov/aphis/home/>)
- The Ohio State University – 4-H Information (<https://ohio4h.org/statewide-programs/animal-sciences/rabbit/rabbit-resources>)
- World Organization for Animal Health (https://www.oie.int/fileadmin/Home/eng/Animal_Health_in_the_World/docs/pdf/Disease_cards/RHD.pdf)
- The Center for Food Security & Public Health and the Institute for International Cooperation in Animal Biologics (http://www.cfsph.iastate.edu/Factsheets/pdfs/rabbit_hemorrhagic_disease.pdf)
- The House Rabbit Society (<https://rabbit.org/>)
- Dove Valley Veterinary Hospital (Cave Creek, Arizona) (<http://www.dovevalleyah.com/>)
- Members of the Maricopa County Small Stock Advisory Committee (AZ)



RABBIT BIOSECURITY & RHD INFORMATION — IN CONCLUSION

Thank you for reviewing this information, and for educating yourself about Rabbit Biosecurity and RHD!

There is more that you can learn about Biosecurity and RHD on the Internet. For the most up-to-date information, join the North Americans RHDV2 Group and/or RHDV Information Page on Facebook.

Compiled and written by Judy Burgess from various sources