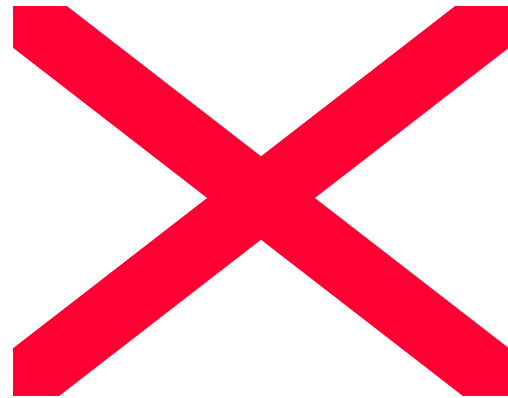




Viral Hemorrhagic Disease





What is VHD?

- Highly contagious disease caused by calicivirus
- Affects only the Oryctolagus cuniculus species
 - Includes wild & domesticated rabbits
 - Doesn't appear to affect any North American native rabbits or hares



Symptoms

- Loss of appetite
- Lethargy
- High fever
- Spasms
- Sometimes bleeding from nose, mouth, and rectum
- Sudden death
 - Very swift and sudden
 - May have no symptoms at all



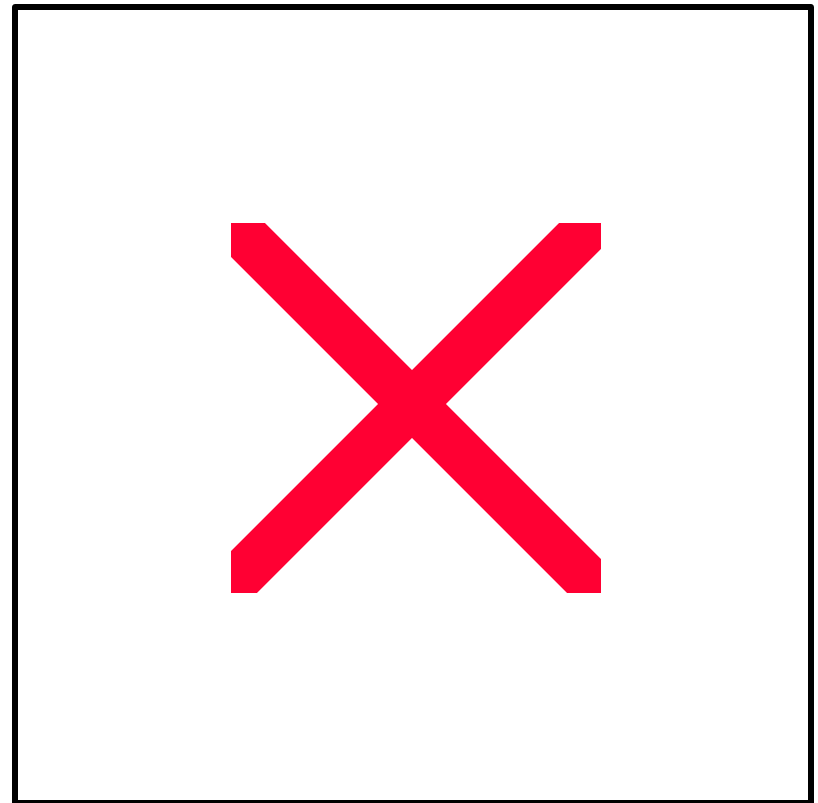
History of RHD

- First surfaced in 1984 in China
- Spread throughout Africa and Europe
 - As far as Sweden
 - Left a trail of dead rabbits
- 1991, Australian researchers tested a calicivirus in order to destroy enormous rabbit population
- Found that it failed to infect 28 domestic species and wild animal species they tested

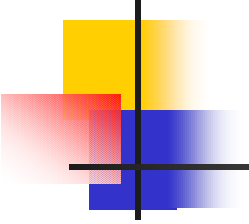


Calicivirus as a Control Agent

- How well does it kill rabbits in the field?
- Does it disrupt breeding success of survivors?
- Does it last a respectable time?



March 1995 viral release in Australia

- 
- Inoculated rabbits with the calicivirus
 - Used to reduce enormous rabbit population
 - 200 – 300 million
 - Created deserts
 - Small animals moved to northern Australia
 - Livestock must compete for pasture
 - Controlled area
 - Wardang Island
 - 700 sites on mainland
 - Used fences, insect sprays and traps, and tested blood of wild rabbits outside of pens



The Escape

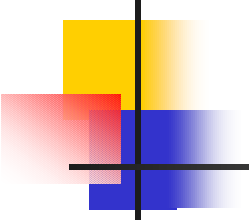
- Late September, virus had evaded containment
- Researchers killed any that had survived near the site
 - Stopped the spread all over the island
 - Had already spread to the mainland
 - Containment was a losing battle
- Quickly spread to New South Wales and Queensland
- It appeared to kill between 80-95% of the adult rabbits it encounters
- Halved Australia's rabbit population



How VHD is Spread

- Researchers were unsure how the virus escaped to the mainland
- Insects?
- Feces matter?
- Rabbit meat?
- Intentionally?

Known to Spread:

- 
- Contact of a rabbit with inanimate objects contaminated with virus
 - Direct contact of a rabbit with an infected rabbit or the feces of an infected rabbit
 - Contact with rabbit products of infected rabbits
 - Insects, birds, and animals spread virus by acting as an indirect host
 - Humans



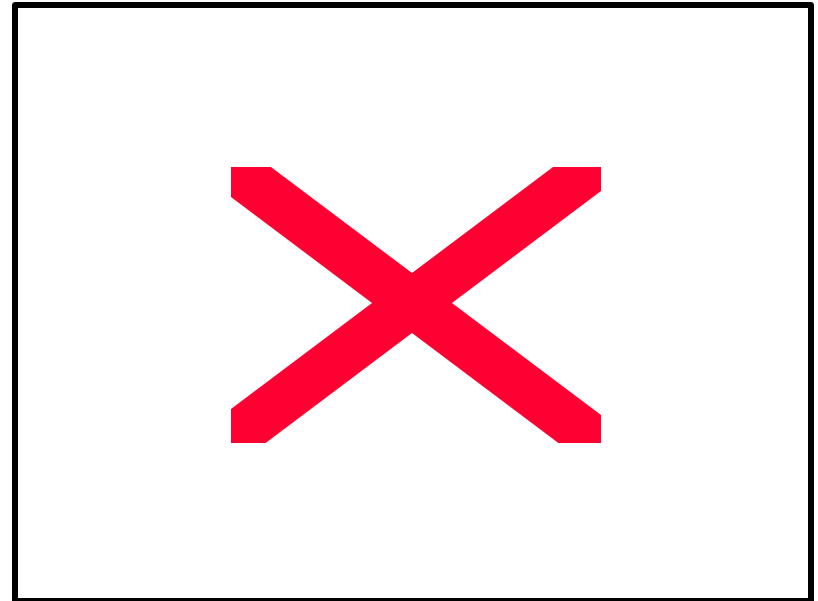
Taxonomy of Caliciviruses

- Identified in many animal species including humans, primates, cattle, mink, swine, walruses, dolphins, dogs, rabbits, chickens, reptiles, amphibians, and insects
- Limited serological relationships among strains from humans
- Little or no serological relationships detected among viruses from other species



Host

- The virus infects:
 - Vertebrates
 - Invertebrates





Genome

- RNA
- Single stranded
- Linear
- Genomic nucleic acid positive sense
- Genome monopartite
- Total genome 7900 nucleotides long
- 5' terminus has genome-linked protein (VPg)
- 3' terminus has a poly (A) tract



Morphology

- Distinct viral structures visible in thin sections of infected tissue
- Virions not enveloped
- Capsids isometric
- Nucleocapsid with 32 cup-shaped depressions
- 35-39 nm in diameter
- Symmetry icosahedral



The Plague of VHD

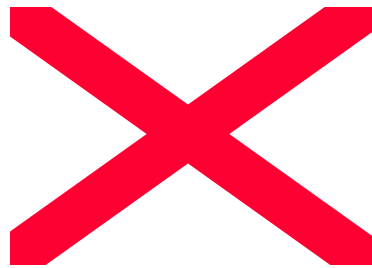
- 1989 in Mexico, a supermarket worker handled contaminated rabbit meat imported from China
- Worker had his own rabbit-breeding business
- Took Mexico 5 years to get rid of it



A United States Threat

- Rabbits are allowed to enter if they “appear” healthy
- Not tested for disease
- 324,000 lbs of rabbit meat enter US annually
 - Along with thousands of live rabbits

First Confirmed Case of VHD in United States



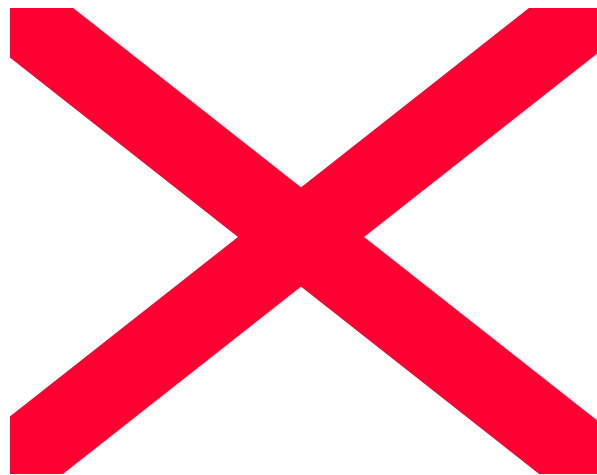
- April 10, 2000
- Affected rabbits on a farm in Crawford Co., Iowa
- Of 27 rabbits in the rabbitry, 25 died
- Remaining 2 purchased by state and destroyed



U.S. Domesticated Rabbits

- Potential for epidemic is tremendous
- Spread easily at rabbit fairs
 - ARBA convention 2000 Columbus, Ohio had 27,000 entries
 - ARBA 1999 Louisville, KY had 33,000 entries
 - 4-H fairs, State fairs, club shows, and statewide open shows

Show Pens





- No available vaccine

- At least none that has met the approval of the FDA

- Some countries don't use the vaccine during an outbreak

- Ensures detection of sick animals with an antibody test

- Vaccinated animals also produce the antibodies

