


Rinderpest

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Rinderpest
Cattle Plague




Rinderpest is a contagious disease of cattle, sheep, and goats that has also been called cattle plague.

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Overview

- Cause
- Economic impact
- Distribution
- Transmission
- Disease in animals
- Prevention and control



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In today's presentation we will cover information regarding the virus that causes rinderpest and its characteristics. We will also talk about the economic impact the disease has had in the past and could have in the future. Additionally, we will talk about how it is transmitted or spread, the types of animals it affects and the disease in animals (clinical signs). Finally, we will address prevention and control measures for the disease as well as actions to take if rinderpest is suspected.

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The Cause


Let's begin by discussing the cause of rinderpest.

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Rinderpest

- Rinderpest virus (RPV)
- Other members of the family include
 - Human measles virus
 - Canine distemper virus
- Disease caused by one type of virus
 - Field strains vary



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This disease is caused by the rinderpest virus (RPV) which is very similar to canine distemper virus and human measles virus, two very contagious diseases. There is only one type of rinderpest virus, but field strains vary widely in severity of the disease they cause, how easily they spread between animals and what type of animals they infect. Photo (Electron photomicrograph of the rinderpest virus) from The Big Picture Book of Viruses: Paramyxoviridae accessed at www.virology.net/Big_Virology/EM/rpv1.JPG.

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Importance

Rinderpest is a threat to the U.S. because American livestock are naïve and it could have a huge economic impact.

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History

- "Rinderpest"
 - German for pestilence or cattle plague
- 1184 BC: The siege of Troy
- 1762: First veterinary school established in France
- 1885: "Great African Pandemic"
- 1960's: Eradicated from most of Europe, China, Russia, Far East
- 1992: Global Rinderpest Eradication Program (GREP)


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The word "rinderpest" is German for pestilence or plague of cattle. Accounts of rinderpest virus or cattle plague date back to the siege of Troy in 1184 BC. Since that time RPV has been associated with war and movement of armies. War remained a factor in RPV spread when refugees from Iraq brought infected cattle with them into Turkey in the early 1990's. RPV was responsible for the establishment of the first veterinary school in 1762 in Lyon, France. 1885 marked the "Great African Pandemic" which killed 80-90% of the wild ruminants; 2.5 million cattle died in South Africa alone. In the 1960's RPV was eradicated from most of Europe, China, Russia and the Far East. 1992 saw the establishment of the Global Rinderpest Eradication Program (GREP) by the Food and Agriculture Organization of the United Nations (FAO).

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Economic Impact

- Destroys entire populations of cattle
- Leads to famine in cattle dependent areas
- 1982 to 1984 outbreak: \$500 million
- \$100 million spent annually on vaccination



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Outbreaks of rinderpest can have devastating economic effects. Rinderpest is highly contagious and can destroy entire populations of cattle and buffalo. Outbreaks can lead to famine in areas where cattle are depended upon for meat, milk and draft power. An epidemic in sub-Saharan Africa in the 1980's wiped out most of the cattle. A 1982 to 1984 outbreak in Africa caused an estimated loss of \$500 million as a result of livestock losses and control measures. It is estimated that \$100 million is spent annually world-wide for vaccination. (Photo: www.fao.org)

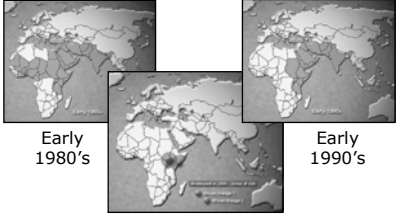
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Distribution

Next we will discuss where rinderpest is found and how severely it affects animals with the disease.

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Global Rinderpest Eradication Program



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This series of maps from the Global Rinderpest Eradication Program (GREP), shows how well the program has worked towards eradicating rinderpest. The map in the upper left shows rinderpest endemic areas in the 1980's, the map in the upper right is the 1990's, and the lower center map shows the remaining foci of rinderpest in Africa in the 2000's. GREP is designed to respond to and address all rinderpest outbreaks in order to reach the goal of complete eradication by the year 2010. Their goals and challenges are to eliminate the last foci of virus persistence, remove doubt about rinderpest persistence, persuade uncommitted countries to endorse GREP, strengthen rinderpest surveillance and emergency preparedness and to ensure cessation of unnecessary mass vaccination.


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Animals Affected

- Cattle, buffalo
- Most wild and domestic cloven-hooved animals can become infected
 - Zebu, sheep, goats, pigs and wild ungulates in contact with cattle
 - Without reinfection from cattle RPV would die out in wild game



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Rinderpest is a serious disease mainly of cattle and domestic buffalo, including water buffalo. Most wild and domestic cloven-hooved animals can become infected including zebu, sheep, goats, pigs (Asian pigs appear to be more susceptible than African or European pigs) and wild ungulates including African buffalo, elands, kudus, wildebeests, antelopes, bush pigs, warthogs, giraffes and hippopotamuses. In Africa, 13 species of game animal are naturally infected with rinderpest virus and six more species can be infected experimentally. Buffalo and wildebeest are the greatest RPV spreaders; but without reinfection from cattle, rinderpest would probably die out in wild game. (Photos: www.fao.org)

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Sickness/Death

- Prognosis is poor in previously non-infected populations
- Death rates may reach 100%
- Susceptible stock are immature or young adults



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In most cases, the prognosis for rinderpest is poor. This is especially true where it occurs in previously non-infected populations and the animals have no immunity. Under these conditions, death rates can reach 100%. Animals that do recover are immune for life. In areas where the virus is present, newborn animals are protected from 6 to 11 months of age by immunity passed on from their mother. Because this immunity does not last, the most susceptible animals are the immature or young adults. (The black and white photo depicts the mass burial of animals that died from rinderpest)

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Transmission


Spread of the virus

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Animal Transmission

- Direct contact
 - Nasal/eye secretions
 - Feces, urine, saliva and blood
- Oral ingestion of contaminated food or water
- Fomites
 - Contaminated clothing and equipment



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Rinderpest virus is mainly transmitted or spread by direct or close contact with infected animals. Virus is shed in nasal and eye secretions and in feces, urine, saliva and blood. To a lesser degree, oral ingestion of contaminated food or water can transmit RPV. In addition, contact with fomites or contaminated objects like clothing and equipment can cause indirect spread, but this is not common because the virus does not survive in the environment very long. (Photo: FAO)

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Animal Transmission

- Aerosol transmission
 - Very short distances only
- Most infectious period
 - 1-2 days before clinical signs
 - 8-9 days after onset of clinical signs
- Vector transmission unknown
- No chronic carrier state
- Wildlife not a reservoir unless cattle are infected

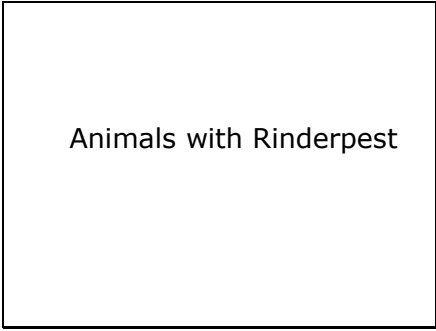
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Aerosol transmission of RPV occurs but only for very short distances. The most infectious period is 1 to 2 days before the onset of clinical signs and then up to 8 or 9 days after onset of clinical signs. Transmission via insect vectors is not known to occur. No chronic carrier state exists and rinderpest virus does not persist in wild populations without the presence of susceptible cattle.

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Clinical Signs

- Time period from exposure to signs of disease
 - Usually 4 to 5 days
- Four forms
 - Classic
 - Peracute
 - Subacute
 - Atypical



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The time from exposure to the development of disease (incubation period) and clinical signs vary with the strain of virus, dosage and route of exposure. Following natural exposure to the virus, the time until an animal shows illness ranges from 3 to 15 days but is usually 4 to 5 days. Clinically, RPV can occur in four different forms: the classic form, the peracute form, the subacute form, and the atypical form. (The photo depicts a cow that is unable to stand due to infection with rinderpest; source: Newsletter of the Tropical Medicine Association)

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Classic Form of Rinderpest

- Fever, depression, lose of appetite
- Constipation followed by bloody diarrhea
- Nasal/eye discharge
- Raw/open sores in the mouth
 - Drooling
- Dehydration
- Death in 6 to 12 days



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The classic form of Rinderpest virus is most common and consists of fever, constipation followed by watery diarrhea with blood, discharge from the eyes and nose, ulceration and raw/open sores in the mouth that causes drooling, enlarged lymph nodes, dehydration and death in 6 to 12 days. Photo shows erosions on the palate of a cow infected with rinderpest. (Photo of mouth: http://www.vetmed.ucdavis.edu/vetext/INF-DA/INF-DA_Rinderpest.html)

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Other Forms of Rinderpest

- Peracute
 - Young animals
 - High fever
 - Death within 2 to 3 days
- Subacute
 - Mild clinical signs with low death rates
- Atypical
 - Irregular fever, mild or no diarrhea
 - Weakened immunity leading to secondary infections



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Peracute cases usually occur in young animals and are characterized by a very short course of the disease. These animals have a high fever and death typically occurs in 2 to 3 days. The subacute form of rinderpest virus infection shows mild clinical signs combined with low death rates. The atypical form is characterized by an irregular fever and mild or no diarrhea. Some animals will develop immunosuppression, which means that their immune system is weakened and they are not as able to fight off other diseases. This can lead secondary infections from other disease agents that would not normally cause disease. Photo of calf: P. Roeder at fao.org;

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Actions to Take

Contact your veterinarian
Stop all animal movement

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If you suspect rinderpest due to a rapidly spreading illness with fever and sudden onset that affects ALL ages of animals in less than one month's time, contact your veterinarian immediately and stop all animal movement.

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S 1 i d e 2 0	Rinderpest in Humans <ul style="list-style-type: none">• Rinderpest virus does not cause disease in humans <p style="text-align: right; font-size: small;">Center for Food Security and Public Health Iowa State University 2006</p>	Rinderpest is not known to cause disease in humans.
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S 1 i d e 2 1	Prevention and Control	There are various prevention and control methods that can be applied to rinderpest. These will be discussed next.
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S 1 i d e 2 2	Prevention <ul style="list-style-type: none">• Do not allow any animals to leave or enter your premises• Do not allow contact of your animals with neighbor's livestock<ul style="list-style-type: none">– Avoid fence line contact <p style="text-align: right; font-size: small;">Center for Food Security and Public Health Iowa State University 2006</p>	To prevent rinderpest from entering your farm, all animal movement on and off your premise must be stopped. Eliminate direct contact between animals of neighboring operations, even across fence lines.
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S 1 i d e 2 3	Control <ul style="list-style-type: none">• No known treatment• On-farm quarantine of exposed animals• Slaughter of affected animals• Vaccination only if directed by the authorities• Preventative measures are key <p style="text-align: right; font-size: small;">Center for Food Security and Public Health Iowa State University 2006</p>	There is no known treatment for rinderpest virus infection; this, combined with the high rates of illness, accounts for the devastating nature of the disease. As soon as an outbreak is suspected, animals that were exposed to others with rinderpest must be quarantined. Infected and exposed animals will likely be slaughtered and this can account for significant economic losses. In addition to the prevention measures on the previous slide, the use of vaccination will be decided by the proper authorities and vaccination should only be used under the direction of these authorities. Because of the lack of effective treatment, preventative measures are of key importance.
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S 1 i d e 2 4	Control <ul style="list-style-type: none">• Properly dispose of animals and contaminated material• RPV is killed by most disinfectants<ul style="list-style-type: none">– Sodium hypochlorite<ul style="list-style-type: none">• 3% household bleach– Sodium carbonate<ul style="list-style-type: none">• Soda ash– Virkon® S <p style="text-align: right; font-size: small;">Center for Food Security and Public Health Iowa State University 2006</p>	The animals and contaminated materials will need to be disposed of properly. The rinderpest virus is killed by most common disinfectants. Regular household bleach is effective and adding 2 gallons of bleach to 3 gallons of water and mixing thoroughly will provide the correct dilution. Other common disinfectants such as sodium carbonate (soda ash) and Virkon® S are effective.
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Additional Resources

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Internet Resources

- Center for Food Security and Public Health
– www.cfsph.iastate.edu
- World Organization for Animal Health (OIE) website
– www.oie.int
- USAHA Foreign Animal Diseases – “The Gray Book”
– www.vet.uga.edu/vpp/gray_book
- Food and Agriculture Organization of the United Nations
– www.fao.org

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Acknowledgments

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