Re-emergence of Rinderpest : Role of wildlife and closely associated viral species

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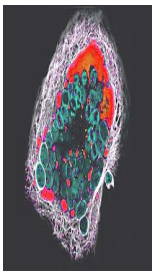


OUTLINE

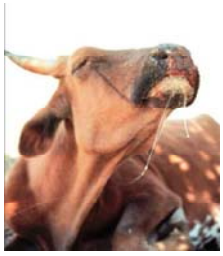
- Introduction
- Current Knowledge
- Future Directions

INTRODUCTION

What is Rinderpest (RP) ?

Rinderpest (RP) is an acute or subacute, contagious viral disease of ruminants and swine, and is of major importance to the cattle industry.

Also, called as cattle plague.



www.cvm.tamu.edu/FADR/Files/**Rinderpest**NXPowerLite.**ppt**

HOST RANGE

- **All cloven-hoofed animals are susceptible (not all are clinical)**
- **Most clinical cases occur in cattle and water buffalo.**
- **I/P is 3-15 days.**
- **Wildlife NOT reservoir(?)**

www.cvm.tamu.edu/FADR/Files/**Rinderpest**NXPowerLite.**ppt**

Clinically…

RP is characterized by high fever, lachrymal discharge, inflammation, hemorrhage, necrosis, erosions of the epithelium of the mouth and of the digestive tract, profuse diarrhea, and death.

The "four D's" of RP:

- **Depression**
- **Diarrhea**
- **Dehydration**
- **Death**

www.cvm.tamu.edu/FADR/Files/**Rinderpest**NXPowerLite.**ppt www.fao.org**

History

- **1184 BC:**
  - The siege of Troy
  - War and movement of armies
- **1762:**
  - First veterinary school established in France in response to RP.
- **1885:**
  - "Great African Pandemic"
- **1960's:**
  - Eradicated from most of Europe, China, Russia and Far East
- **1992:**
  - Global Rinderpest Eradication Program (GREP)

www.cfsph.iastate.edu/DiseaseInfo/ppt/Rinderpest.ppt http://www.fao.org/news/story/en/item/80728/icode/

The Organism

- Family *Paramyxoviridae*
- Genus *Morbillivirus*
- Other members of the family include
  - Peste des Petits Ruminants (PPR)virus
  - Measles virus
  - Canine distemper virus
- Only one serotype; but field strains vary.

The Big Picture Book of Viruses: Paramyxoviridae accessed at www.virology.net/Big_Virology/ EM/rpv1.JPG. www.cvm.tamu.edu/FADR/Files/**Rinderpest**NXPowerLite.**ppt**

Economic Impact

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

http://www.fao.org/News/1996/960805-e.htm www.cvm.tamu.edu/FADR/Files/**Rinderpest**NXPowerLite.**ppt**

Eradication…..CHINA, EUROPE

- By 1960's RP was eradicated from EUROPE, CHINA, RUSSIA and FAR-EAST (Plowright vaccine - 1962).
- Though the virus was widely distributed through out Europe, Africa, Asia and West Asia. But never became established in either the Americas or Australia – New Zealand.
- Should they worry……????

Eradication

- Eradication programs:
- **Asia** – Intensive vaccination program supported by FAO. West Asian Rinderpest Eradication Campaign (WAREC) + the South Asian Rinderpest Eradication Campaign (SAREC).

- **Africa:**
- Joint Program 15 (JP15)
- Pan African Rinderpest Campaign (PARC)
- Pan African Program for the control of Epizootics (PACE)
- **World-wide:**
- Global Rinderpest Erradication Program(GREP)

JP15(1962-1976)

- 22 African countries.
- Strategy:
- Vaccinate all animals for 3 years.
- Then, vaccinate all calves annually.
- By, mid 70's : RP disappeared from many countries.
- By the end of the project, due to looser vaccination and surveillance, it again spread in 1980's….100 million cattle died; $2 billion lost in NIGERIA alone.

http://www.onehealth2011.com/pres/Monday/mon%20101%201500%20kock%20%5BCompatibility%20Mode%5D.pdf

PARC (1986-1998)

- 34 African countries
- Strategy
- Mass vaccination – THERMOSTABLE vaccine.
- Systematic epidemiological surveillance.
- Improvement of livestock farming and services.
- Integration to GREP

http://www.onehealth2011.com/pres/Monday/mon%20101%201500%20kock%20N5BCompatibility%20Mode%5D.pdf

PACE (1999-2004)

- 32 African countries.
- Strategy
- Establish lower-cost national and continental epidemio-surveillance networks.
- Eradication of RP.
- 27 countries declared no outbreaks of RP

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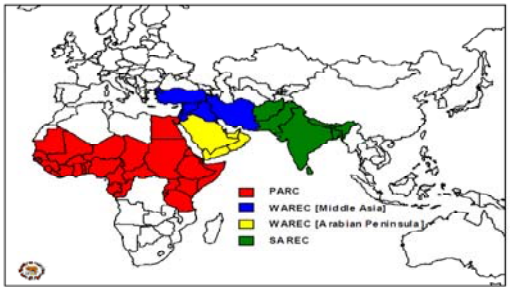
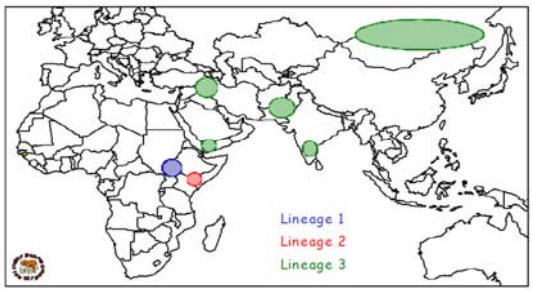
GREP (1994-2011)



PARC + WAREC (middle east and Arabian penninsula)+ SAREC.

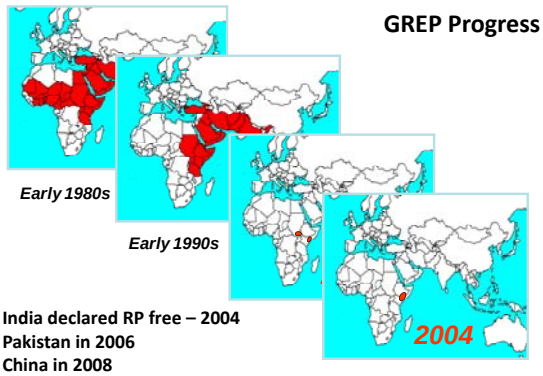
http://www.ifpri.org/sites/default/files/publications/ifpridp00923.pdf

The seven known or suspected reservoirs of rinderpest virus infection in 1996, indicating the lineages of virus involved



http://www.ifpri.org/sites/default/files/publications/ifpridp00923.pdf

GREP Progress



India declared RP free – 2004
Pakistan in 2006
China in 2008
Middle east – 2009-10.

www.fao.org

Current

May, 25th 2011, OIE declares RP eradicated.

www.fao.org/ag/againfo/resources/documents/AH/GREP_flyer.pdf

Impact of RP Eradication

- **Green Revolution in the 3rd world.**
- **Food Security.**
- **Upliftment of the poor farmers in south east Asia and east Africa.**

Future Directions

Buffalo – Potential reservoir!

Transmission between cattle and buffalo confirmed experimentally

http://www.onehealth2011.com/pres/Monday/mon%20101%201500%20kock%20%5BCompatibility%20Mode%5D.pdf

Warthog- Indicator host

Transmission proved experimentally

http://www.onehealth2011.com/pres/Monday/mon%20101%201500%20kock%20%5BCompatibility%20Mode%5D.pdf

Wild Antelope

Unusual pathogenesis; portal of entry is eye.

http://www.onehealth2011.com/pres/Monday/mon%20101%201500%20kock%20%5BCompatibility%20Mode%5D.pdf

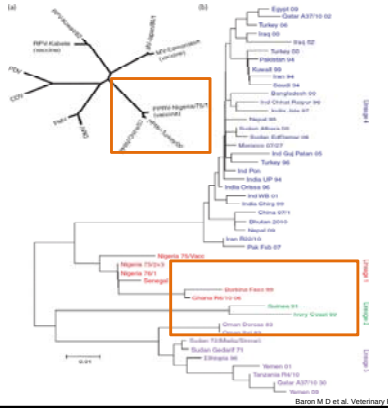
Peste des Petits Ruminants virus (PPRV)

- **Very recent disease – 30 years.**
- **Similar to RP …Clinical signs, mortality, host range.**
- **It's a disease of small ruminants but PPRV antibodies have been isolated from cattle** (M. V. Sc. Thesis – Ashutosh Wadhwa, 2007)

The plague is dead; Long live the plague.

Dhar et al. 2002

Phylogenetic tree of RPV and PPRV



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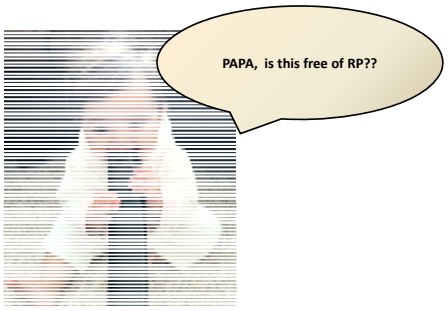

Anaya Wadhwa

Questions ???

Thanks