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The eradication of rinderpest: lessons learned

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Competing interests: Michael D Baron declares that he has no competing pecuniary or non-pecuniary interests
Not exactly an emerging disease…

“A kind of pestilence also visited the population and destroyed great numbers of cattle; however not many persons died of it.”

Dionysius, circa 493 BC
Rinderpest: the disease

Clinical signs
Pyrexia (40-42°C) for 3-8 days; severe ocular and nasal discharges; erosive mouth lesions; diarrhoea; apathy; dehydration and death

REMEMBER THE 3DS:
DEATH
DISCHARGE
DIARRHOEA
RP and the development of veterinary science

European pandemic (1709-1770)
Detailed descriptions of symptoms were recorded.

In Italy, Lancisi applied medical science, introduced:
- slaughter of infected animals;
- movement control, with penalties (!);
- inspection of meat;
- quarantine of infected premises;

Recommended a medical specialization in animal health

1761: First vet school (Alforts, France)
1792: First UK vet school (RVC)
Rinderpest in Africa

Great rinderpest pandemic 1890s

“[corpses] so many and so close together that the vultures had forgotten how to fly.”
(Masai elder)
Rinderpest in Africa

Course of rinderpest epidemic from North to South Africa 1887-97

R. Mack (1970) Trop Anim Hlth Prod 2, 210-9
“never before in the memory of man, or by the voice of tradition, have the cattle died in such numbers; never before has the wild game suffered” (contemporary writer)

1/3 of entire population of Ethiopia died

2/3 of Masai people of Tanzania/Kenya died (rinderpest + smallpox)

5.2 million cattle died, plus 80%-90% of domestic oxen

Uncounted wildlife died: wildebeest, buffalo, giraffe, antelope
Efforts at rinderpest control

17th/18th Centuries: Movement restrictions and compulsory slaughter (Europe)

19th Century: attempts at protective inoculation (cf Jenner/cowpox)
- infected cattle serum, bile, etc.
- infected material + post-infection serum

20th Century: Vaccines based on live attenuated virus.

Virus adapted to:
- Goats (India)
- Rabbits (Japan, Korea)
- Eggs -> rabbits -> eggs (Japan, Korea, China)
- Cell culture (Africa (Plowright), Russia)
The Plowright vaccine

>90 passages in primary bovine kidney cells
Fully attenuated rinderpest virus
Vaccine safety proven in 6 consecutive passages in cattle
Single dose protected animals for life
Used throughout Africa, Middle East, and the Indian subcontinent
# Rinderpest eradication: why it worked

<table>
<thead>
<tr>
<th>Required for eradication</th>
<th>Rinderpest</th>
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<tbody>
<tr>
<td>Can interrupt transmission</td>
<td>Effective vaccine</td>
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<tr>
<td>Clearly identifiable</td>
<td>Single serotype</td>
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<td>No hard-to-reach reservoir</td>
<td>Severe disease “the 3 Ds”</td>
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<td></td>
<td>Simple PCR/ELISA tests</td>
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<td></td>
<td>Wildlife infected but dead-end</td>
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<td>No arthropod vector</td>
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Lessons learned (1) : Don’t just throw vaccine at it

India National Rinderpest Eradication Programme (NREP) 1955-

Mass vaccination based on goat-adapted vaccine

Result:
Reduction of cases in some states but outbreaks continued

Vaccination became institutionalised

Data from Khera, S.S. (1979) Proceedings of the 2nd International Symposium on Veterinary Epidemiology and Economics
Lessons learned (1): Don’t just throw vaccine at it

India Rinderpest Task Force 1983-95

Started with epidemiological survey – identified specific populations to focus on

Focused vaccination in target areas

Set up a time-limited programme, aiming for 1990

Result:
Last recorded case in India in 1991
Lessons learned (2) : Don’t stop when you are winning

Africa: Joint Programme (JP)15 1962-76

Mass vaccination: >100 million cattle vaccinated, cost US$16.4 million

Result:
Disease cleared from most of continent, apart from part of W Africa

But:
Vaccination devolved to national veterinary services (!)
Campaign had not covered whole area where rinderpest found
Disease reemerged after mass vaccination stopped
Lessons learned (3): involve local stakeholders

Community-Based Animal Health Workers

Local people trained in basic techniques (sampling, vaccination) and engagement/education

Dialogue with local herdsmen to convince them of the benefits of vaccination

Voluntary adoption of methodology

Provide materials and support

Regular feed-back of results
Lessons learned (4): someone has to lead

GREP
- Link efforts of regional bodies
- Co-ordinate programmes (PARC, SAREC, WAREC, etc)
- Provide technical guidance
  - Laboratory network
- Support training and consultation

The OIE Pathway
- No clinical disease for > 2 years:
  - Stop vaccination
  - "Provisional Freedom from Rinderpest"
- No disease for 5 years:
  - "Freedom from Rinderpest Disease"
- No disease for 7 years:
  - "Freedom from Rinderpest Infection"
Lessons learned (5): set a goal

Working to stamp out cattle plague by 2010

The Global Rinderpest Eradication Programme

Contact the GREP Secretariat

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