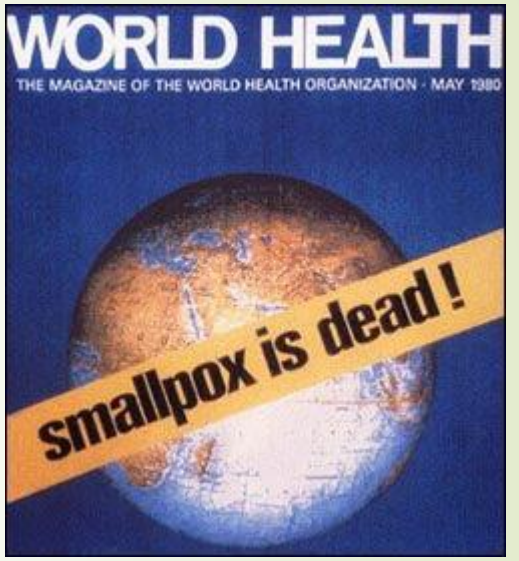
Challenges Conquered and the Role of Vaccination in International Disease Eradication and Control Efforts

Keith Hamilton, Kansas State University, Manhattan, KS

Successes in disease eradication

- Smallpox (1980)



- Rinderpest (2011)

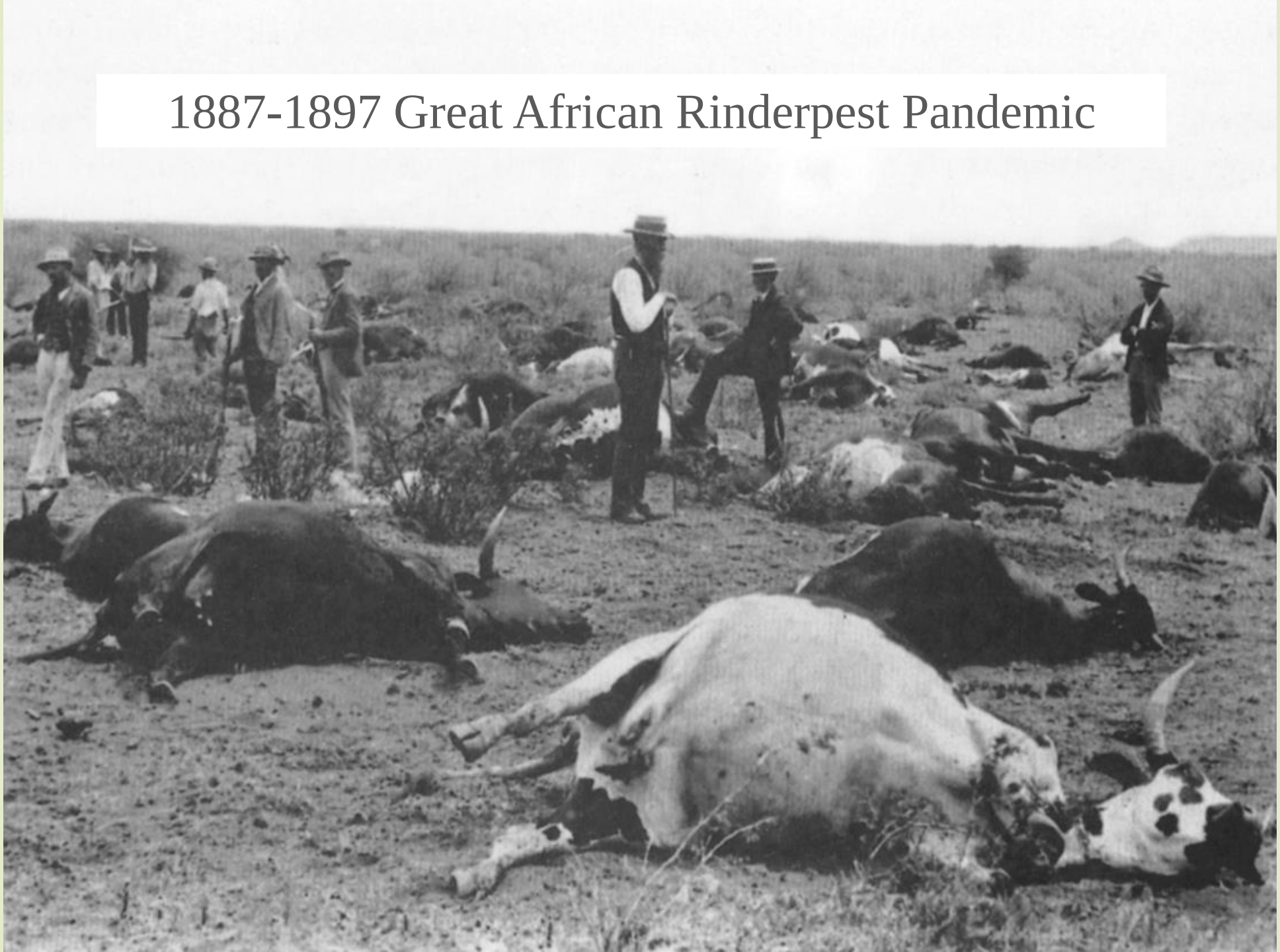
1300s Rinderpest spreads across Asia

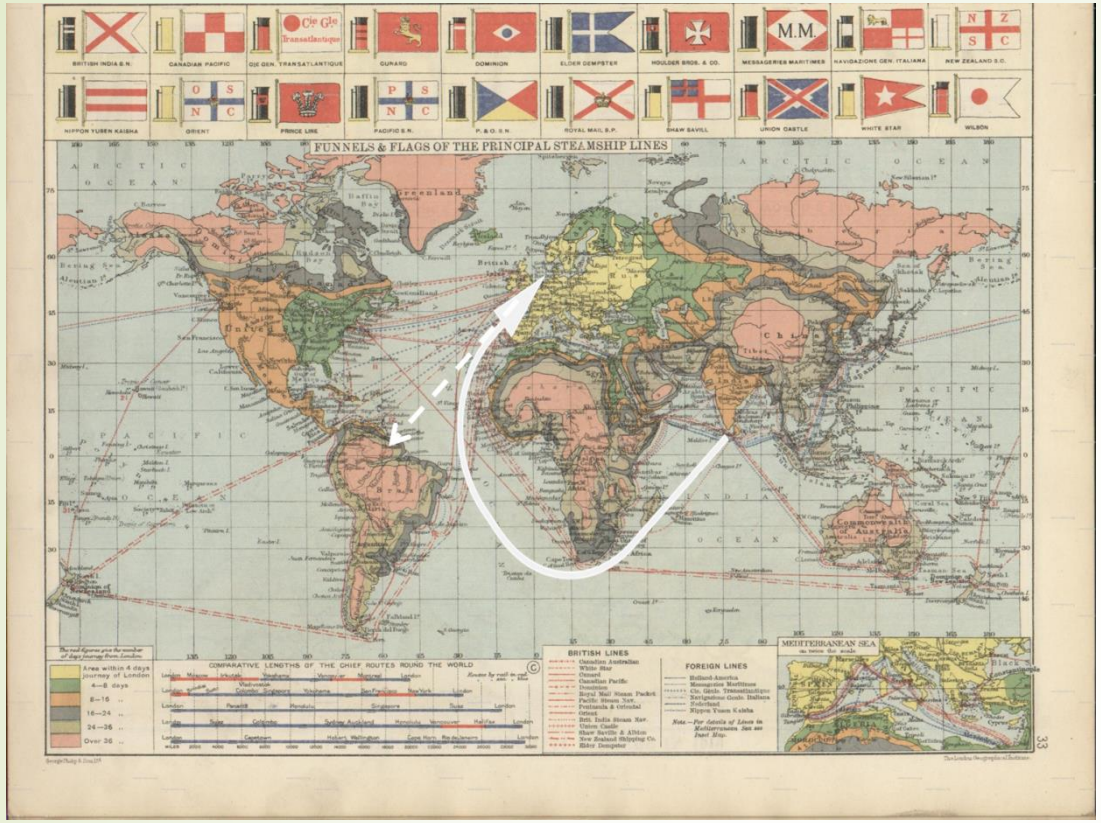

Rinderpest in Netherlands circa 1750

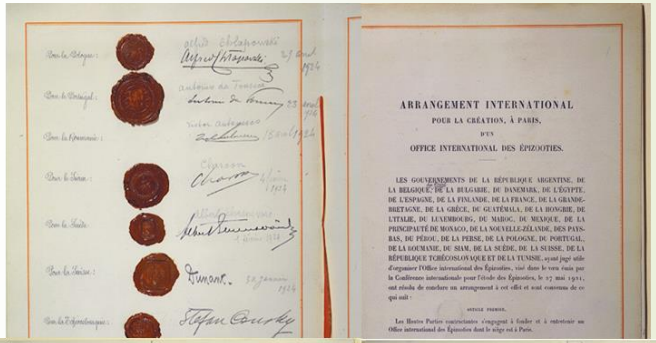
Bourgelat

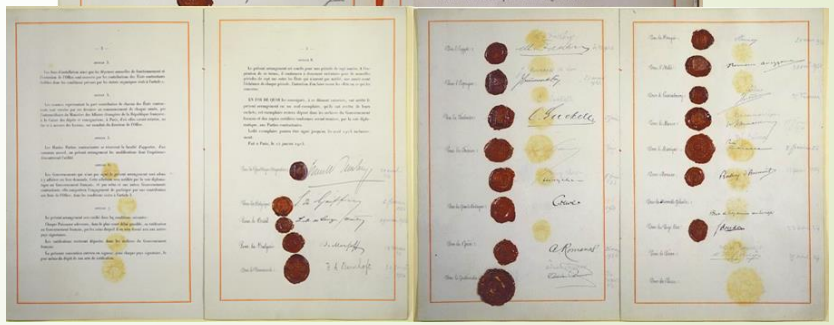
Lyon, France, 1762

1887-1897 Great African Rinderpest Pandemic

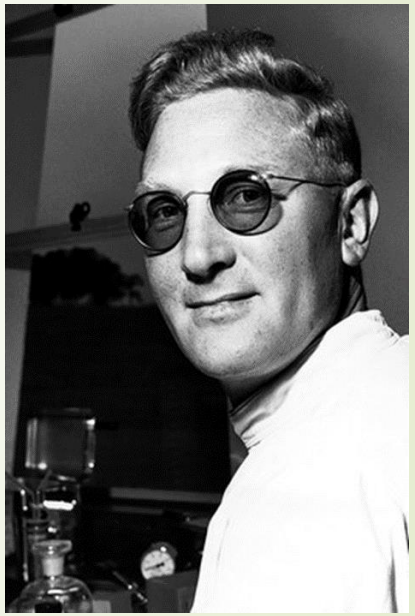



FUNNELS & FLAGS OF THE PRINCIPAL STEAMSHIP LINES
BRITISH INDIA S.N.
CANADIAN PACIFIC
CIE GEN. TRANSATLANTIQUE
CUNARD
DOMINION
ELDER DEMPSTER
HOULDER BROS. & CO.
MESSAGERIES MARITIMES
NAVIGAZIONE GEN. ITALIANA
NEW ZEALAND S.C.
NIPPON YUSEN KAISHA
ORIENT
PRINCE LINE
PACIFIC S.N.
P. & O. S.N.
ROYAL MAIL S.P.
SHAW SAVILL
UNION CASTLE
WHITE STAR
WILSON
COMPARATIVE LENGTHS OF THE CHIEF ROUTES ROUND THE WORLD
BRITISH LINES
FOREIGN LINES
MEDITERRANEAN SEA


ARRANGEMENT INTERNATIONAL
POUR LA CRÉATION, À PARIS,
D'UN
OFFICE INTERNATIONAL DES ÉPIZOOTIES.



Jenner

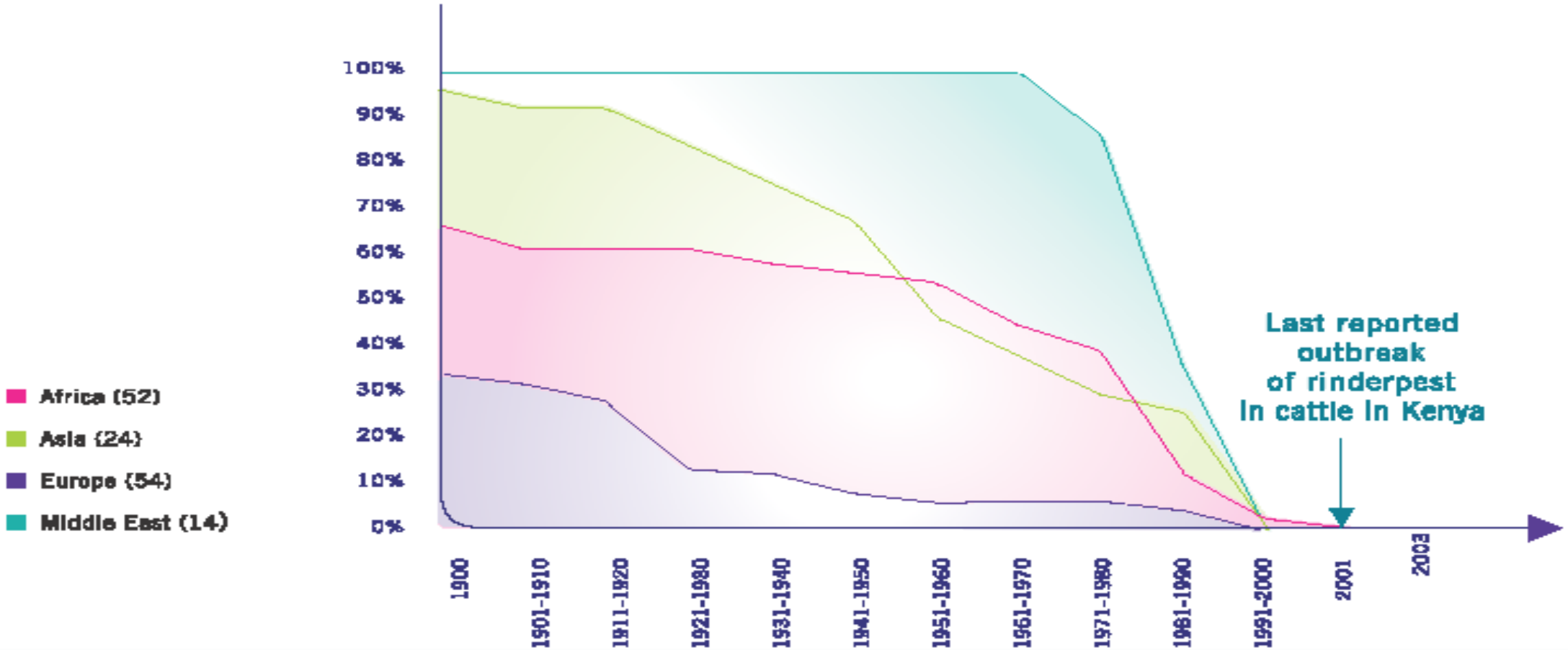


Plowright

ERADICATING RINDERPEST : moments in time

Reported outbreaks of rinderpest steadly declined over the last 100 years.

Share of countries infected with rinderpest in the different regions of the world.

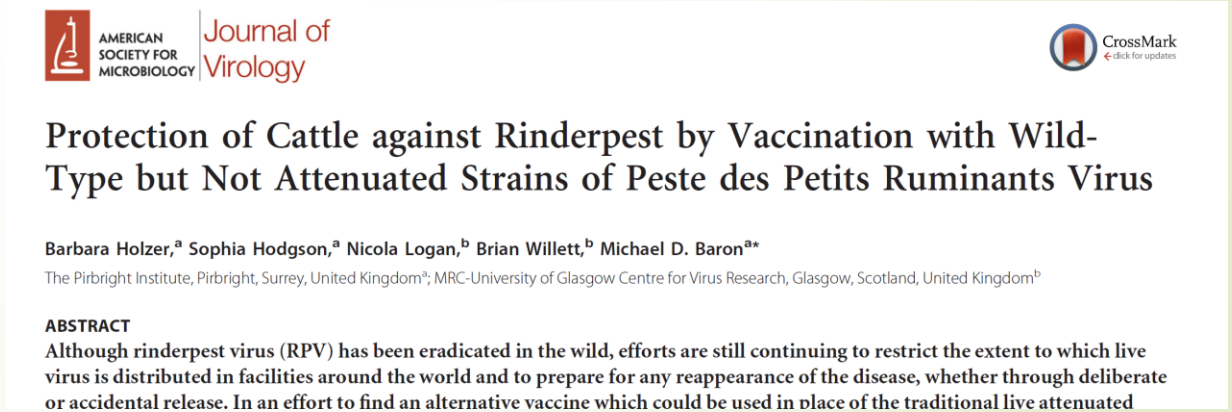


Factors contributing to eventual success

- Infrastructure, sustained investment, partnerships (donors)
- Coordination (regional and international bodies)
- Political will
- Governance and strong health services
- Effective sanitary measures (detection, quarantine)
- **Availability of safe efficacious vaccine providing long-lasting immunity**
- **Availability of cost effective and quality vaccines**
- Antigenic stability (one serotype)
- Narrow host range without carriers

Post-eradication preparedness

- Potential for re-occurrence through a lab accident or criminal act
- Official data shows that rinderpest virus is stored in 22 facilities world wide
  - No formal vaccine stockpile, although 22 institutes have seed stock or manufactured vaccine
  - Unfortunately, study showed that PPR vaccine did not protect against rinderpest infection



AMERICAN SOCIETY FOR MICROBIOLOGY | Journal of Virology

CrossMark click for updates

Protection of Cattle against Rinderpest by Vaccination with Wild-Type but Not Attenuated Strains of Peste des Petits Ruminants Virus

Barbara Holzer,[a] Sophia Hodgson,[a] Nicola Logan,[b] Brian Willett,[b] Michael D. Baron[a]*

The Pirbright Institute, Pirbright, Surrey, United Kingdom[a]; MRC-University of Glasgow Centre for Virus Research, Glasgow, Scotland, United Kingdom[b]

ABSTRACT

Although rinderpest virus (RPV) has been eradicated in the wild, efforts are still continuing to restrict the extent to which live virus is distributed in facilities around the world and to prepare for any reappearance of the disease, whether through deliberate or accidental release. In an effort to find an alternative vaccine which could be used in place of the traditional live attenuated

  - Contingency plans???

Prospects for future eradication

- Peste des petits ruminants (PPR)
- Polio
- Measles
- Rabies from street dogs
- Progressive control of FMD

Solidarity

H5N1 zoonotic influenza

H5N1, the prospect of a pandemic, and the need to share viruses

- 2003-2006 H5N1 spread to poultry in 60+ countries, CFR in human cases 50-60%
- Could this lead to a devastating pandemic?
- Viruses need as potential vaccine candidates (for humans)
- Concerns about access and equity (as well as other factors) were a barrier to sharing viruses

TIME

Thursday, May. 10, 2007

Indonesia's Bird Flu Showdown

By Bryan Walsh/Jakarta

Bird flu may have fallen off the media radar lately, but that doesn't mean the threat has passed. Poultry
Egypt, Laos and Cambodia. The frontline in the war against the disease remains the Southeast Asian n
including 18 this year — than any other country. But the world only has a partial idea of what's happen

Action on animal health side

2 | International Herald Tribune
Thursday, November 3, 2005

Elisabeth Rosenthal

Letter from New York

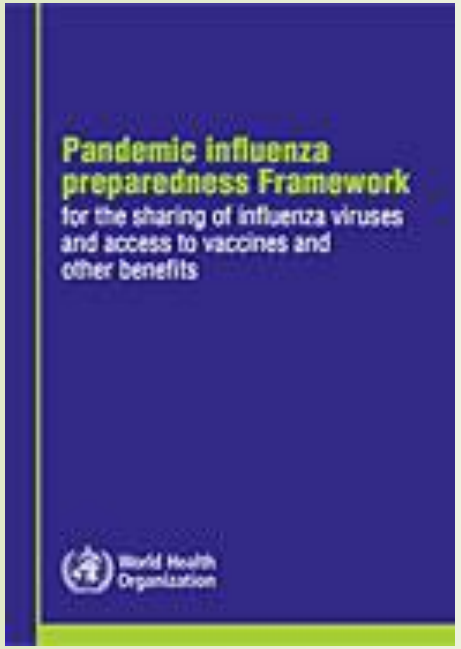
Battle against bird flu must start at its source

NEW YORK Last Friday, I got on a flight in Rome bound for New York, exhausted from work, but healthy — I thought.

But somewhere between Rome and Frankfurt, where I changed planes, sons," said Dr. Lee Jong-Wook, director general of the World Health Organization, at a conference this week. "The economic cost of SARS has been estimated at $30 billi[illegible] ber, there were fewer than 800 deaths throughout the whole outbreak." In-

- Global network of avian influenza labs (OFFLU) (2006)
- Resolution requiring all OIE Reference Labs to share viruses and data (2007)
- Animal health experts at the WHO GISRS vaccine strain selection meetings on H5N1

WHO Pandemic Influenza Preparedness (PIP) Framework



- Strengthen preparedness against pandemic influenza
- Improve sharing of viruses of human pandemic potential and establish more predictable, efficient and equitable **access** to interventions
- Global Influenza Surveillance and Response System (GISRS) is a WHO-coordinated network of national public health labs
- Mechanisms
  - Standard Material Transfer Agreement – contract with manufacturers using GISRS, real time access to products (diagnostics, vaccines, antivirals)
  - Partnership Contribution paid to WHO (supports GISRS)

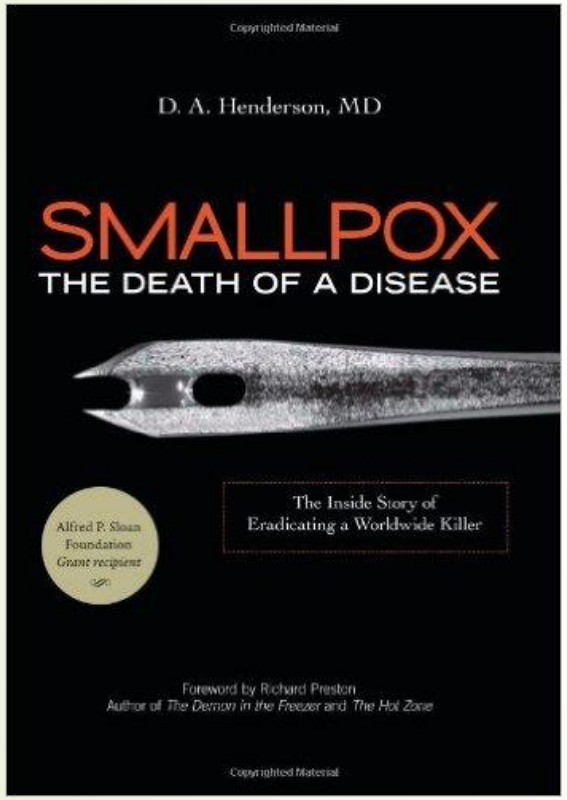
- Could these principles of solidarity be extended to other human and animal diseases and zoonoses?

International vaccine banks

- Public private partnerships
- Ensure ‘access’ to quality vaccines for countries with limited resources
- Can be supported through ‘in kind’ contribution of staff, cold chain transport/storage, syringes and needles (through P-P-Ps, NGOs)
- Avian influenza H5N1 – crisis management
- Foot and mouth disease – contain outbreaks and protect country freedom
- Rabies – break cycle of human transmission/ support elimination from street dogs
- Peste des petits ruminants – support eradication

Concluding remarks

- Not all diseases are eradicable, some are, and vaccines are only part of an effective campaign
- For international disease control efforts, such as influenza, equity, transparency and solidarity are essential
- Investments in international vaccine banks can support international efforts and protect the international community
- Vaccines must be of good quality and sufficiently matched to field strains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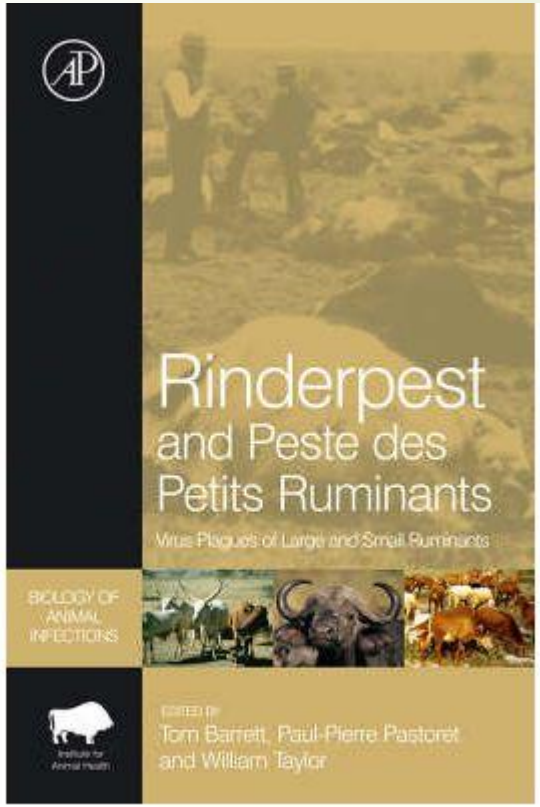
Rinderpest and Peste des Petits Ruminants
Virus Plagues of Large and Small Ruminants
BIOLOGY OF ANIMAL INFECTIONS
Tom Barrett, Paul-Pierre Pastoret and William Taylor