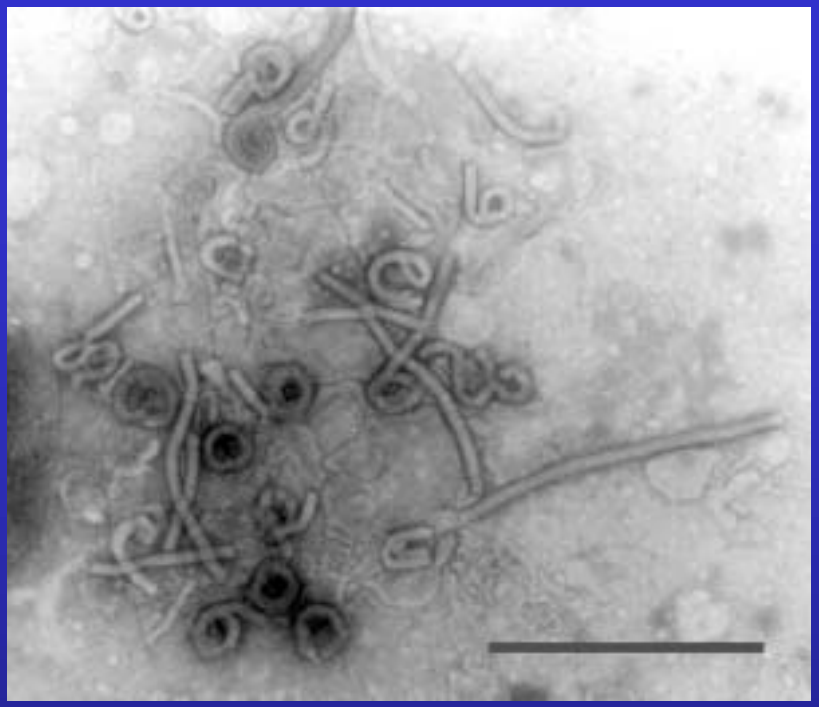
The Interface of Animal and Human Health

75% of all emerging diseases

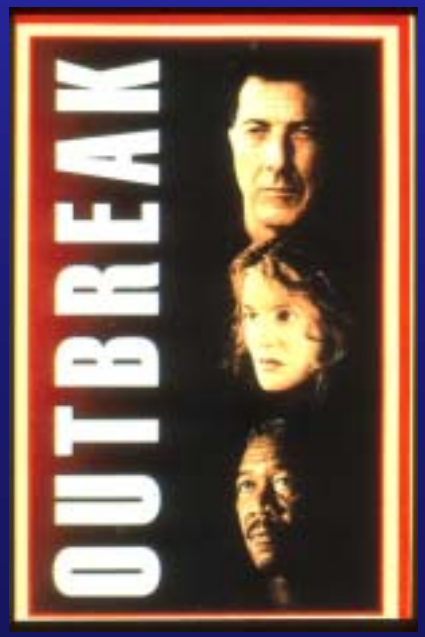
are zoonotic

- Father of modern pathology
- Strong advocate of “one medicine”
- First to use the term “zoonosis”
- Rudolf Virchow

Ebola, 2002



CNN.com / WORLD
WHO confirms Ebola outbreak
GENEVA, Switzerland -- The World Health Organization says there had been at least one case of the deadly Ebola virus in Gabon.

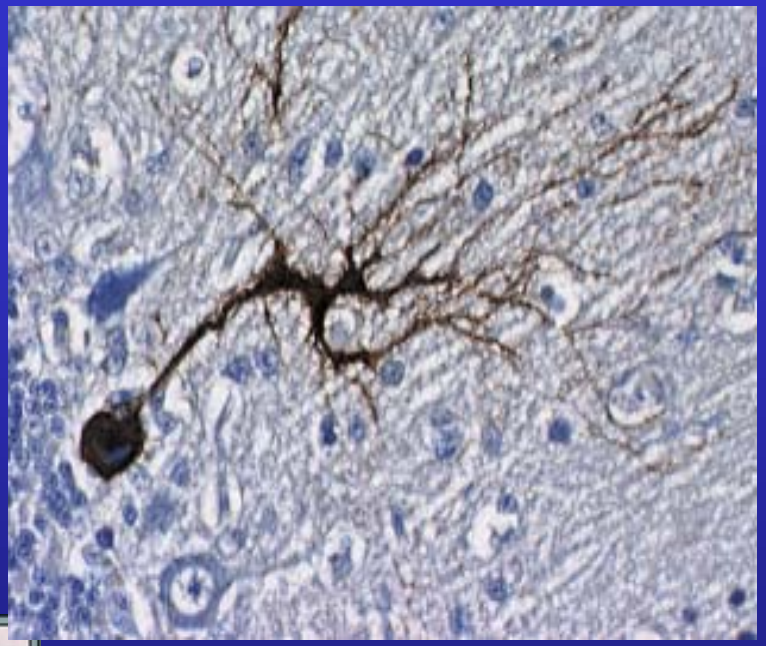

OUTBREAK

A PORTRAIT OF COLONEL NANCY JAAX

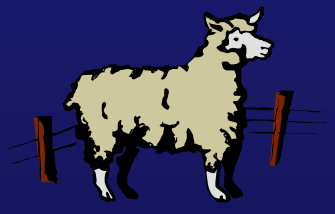
Hendra, Menangle, lyssavirus, Australia

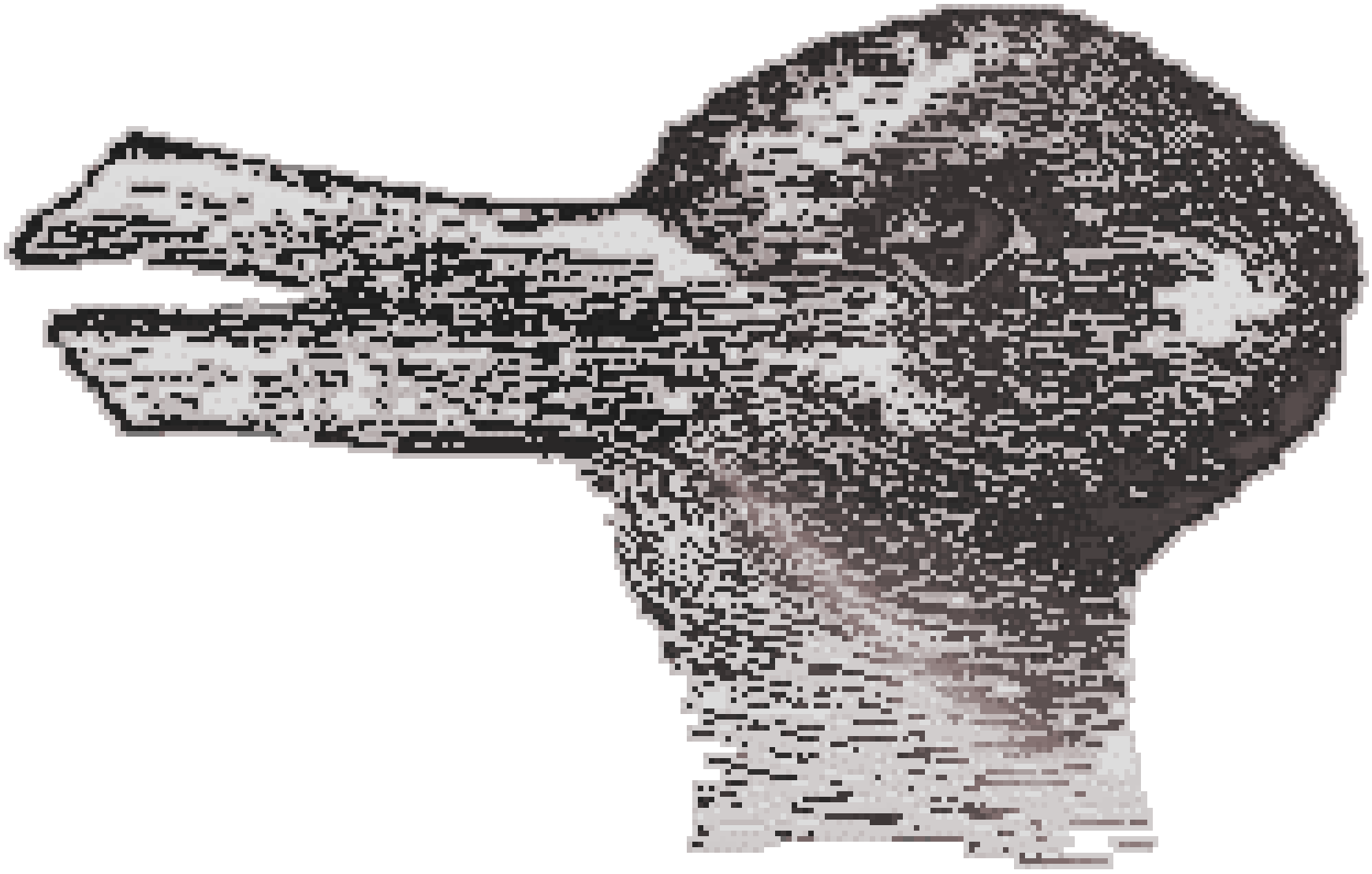
Nipah virus, Malaysia, 1999

West Nile virus, USA, 1999



Rift Valley fever





BSE in Europe

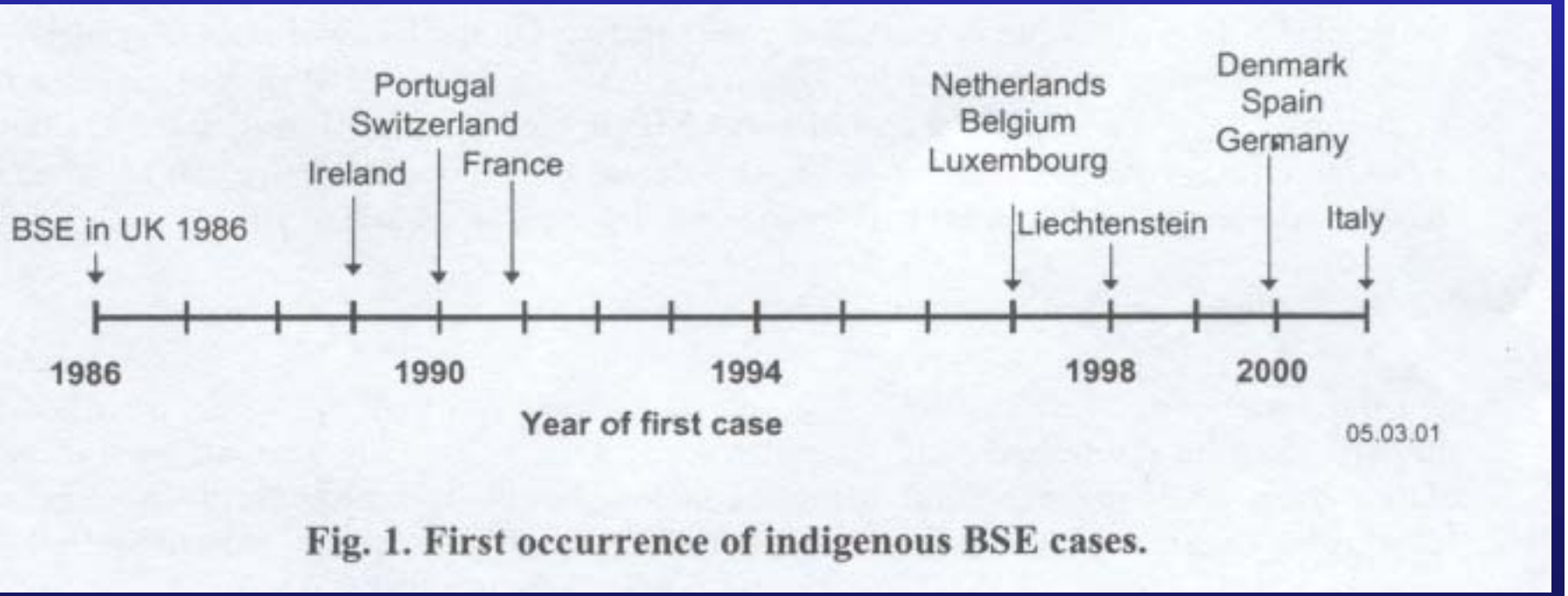
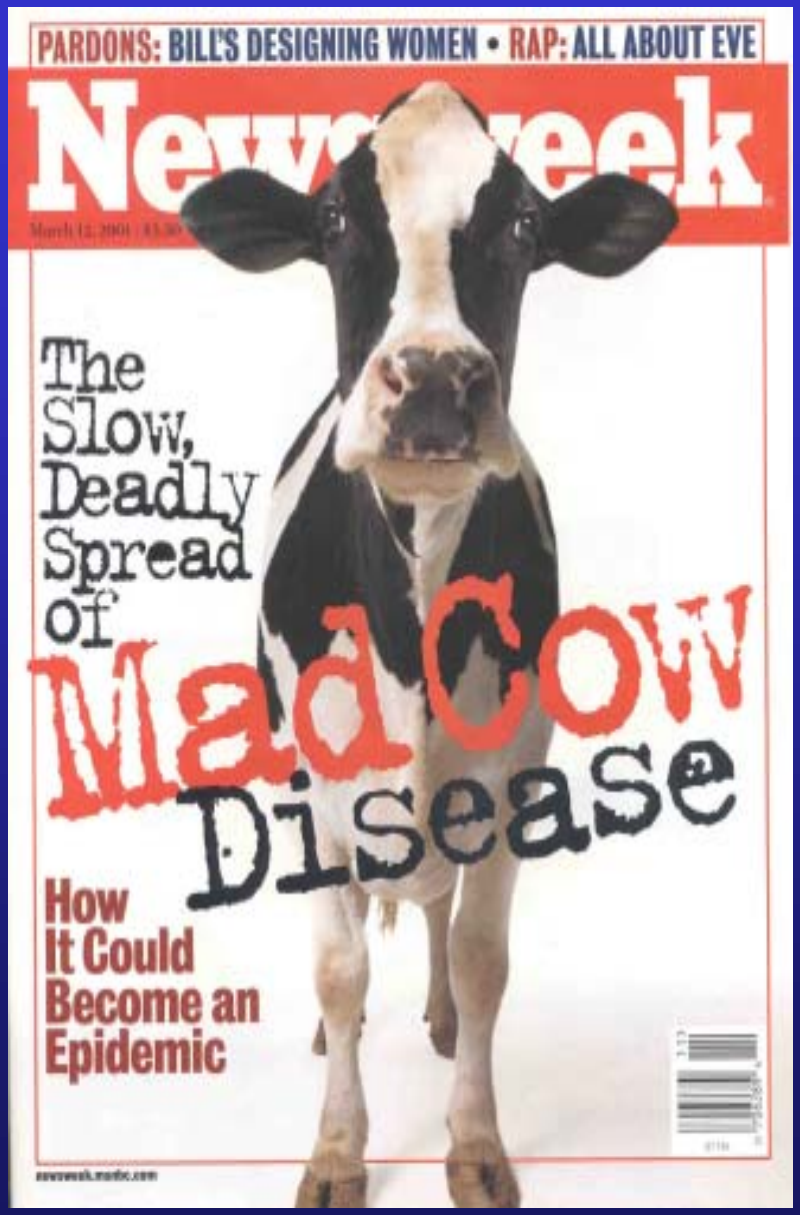


Fig. 1. First occurrence of indigenous BSE cases.

EU Decisions, 2000

- Incinerate all cows >30 months of age (3M cows)
- NO MBM fed to animals
- Incinerate all MBM

  (3M tons per year)



News

Harvard study finds BSE poses little threat to U.S. consumers, agriculture

Still a need for added vigilance, according to Agriculture and Health and Human Services departments

The United States is highly resistant to the introduction of bovine spongiform encephalopathy. And, even if the deadly disease were to enter this country, there is little chance of it becoming established. Those are the conclusions of a Harvard University study commissioned by the Department of Agriculture, assessing the effectiveness of current U.S. measures to guard against BSE.

The study, conducted over a three-year period by the Harvard Center for Risk Analysis, has been eagerly anticipated by government and industry alike. It credited early import prohibitions by the USDA on live ruminants and ruminant meat and bone from Europe, and a feed ban implemented by the Food and Drug Administration as being chiefly responsible for keeping BSE out of the country and for preventing its entrenchment.

"We found that even if BSE were ever introduced, it would not become established," said project director George Gray, PhD, acting director of the Harvard center. "With the government programs already in place, even accounting for imperfect compliance, the disease in the cattle herd would quickly die out, and the potential for people to be exposed to infected cattle parts that could transmit the disease is very low."

The USDA and Department of Health and Human Services welcomed the conclusions, released in late November. It "clearly shows that the years of early actions taken by the federal government to safeguard consumers have helped keep BSE from entering the United States," said Agriculture Secretary Ann Veneman.

"This is a reassuring finding," agreed Health and Human Services Secretary Tommy Thompson. Both Thompson and Veneman believe existing safeguards must continue to be improved.

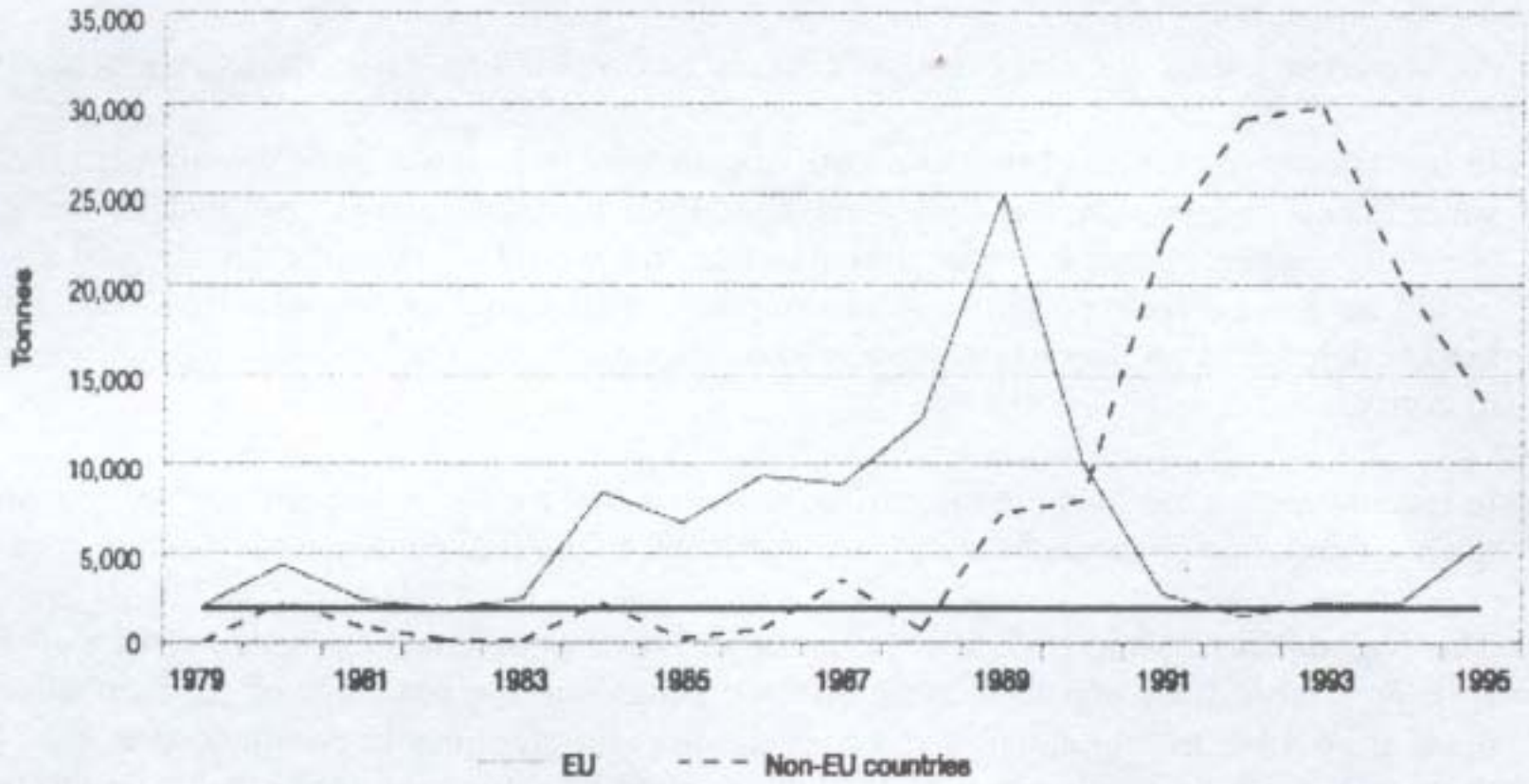
Those sentiments were shared by the National Cattlemen's Beef Association, the largest representative of the nation's cattle farmers and ranchers. "Harvard's report is an important step in this country's ongoing efforts to continually evaluate and enhance the series of firewalls that have effectively protected U.S. cattle herds for more than 15 years," said association CEO Chuck Schroeder.

The study will be peer reviewed by a panel of outside experts to ensure its scientific integrity, according to Veneman.

Not long after BSE was first diagnosed in cattle in the United Kingdom in 1986, the British beef industry was nearly decimated. In Europe, about 100 people have died from a rare neurologic illness known as variant Creutzfeldt-Jakob disease. Many scientists believe the individuals contracted vCJD by eating neural tissue from BSE-infected cattle.

Only recently has the United Kingdom resumed a modest beef exportation program. Nonetheless, the disease has emerged in cattle across Europe

Will BSE continue to spread?

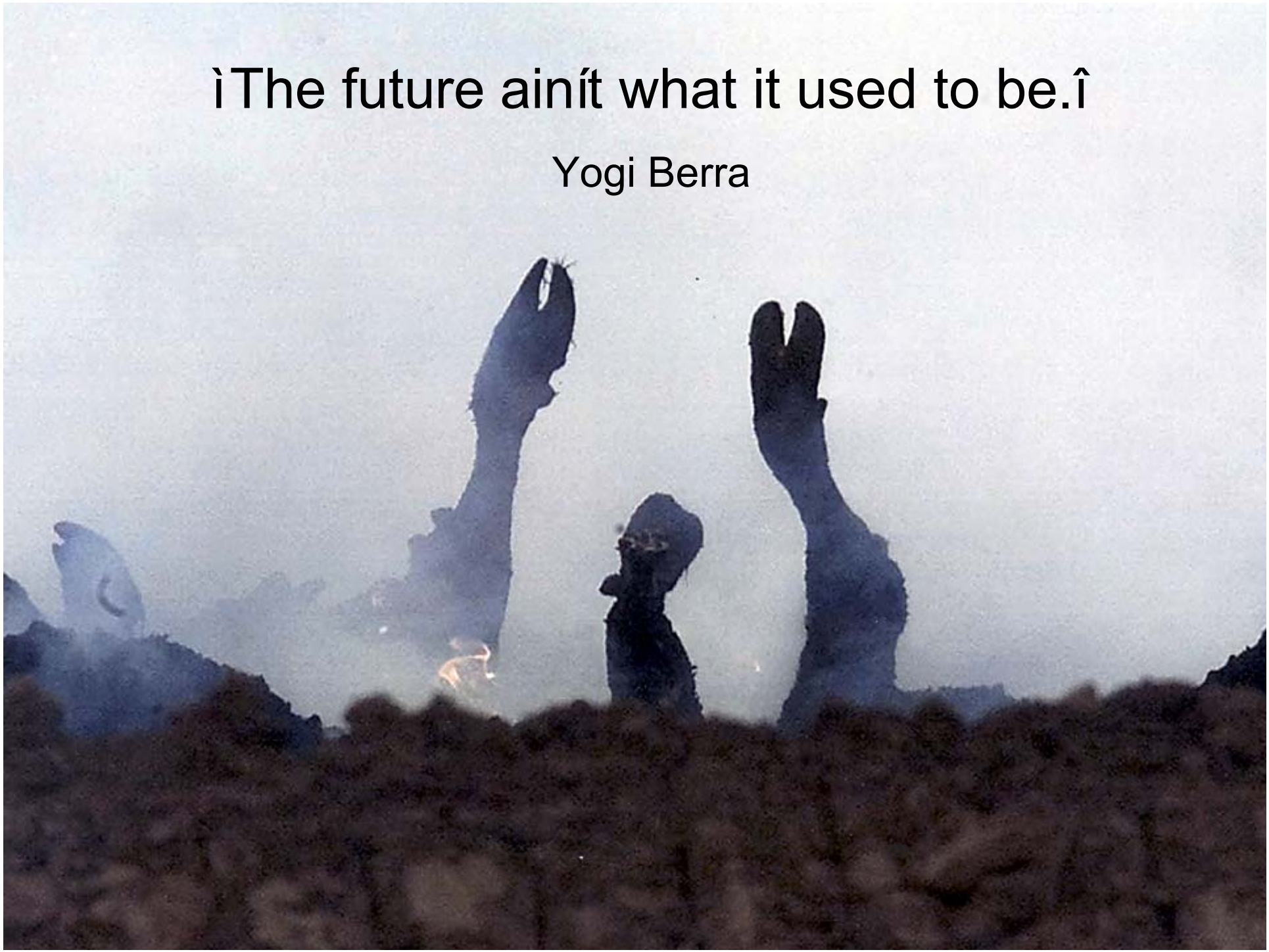


Source: HM Customs and Excise

Fig. 2. UK exports of flours, meals and pellets of meat or meat offal, unfit for human consumption (greaves), 1979–1995.

ìThe future ainít what it used to be.î

Yogi Berra



Death sentence: foot and mouth threatens to cast a shadow over the rural community and those involved in tourism well into the summer

FMD Costs

- Outbreak lasted seven months
- Ten million animals killed
- $4 billion in compensation, cleanup, export losses
- $7.5 billion in lost tourism

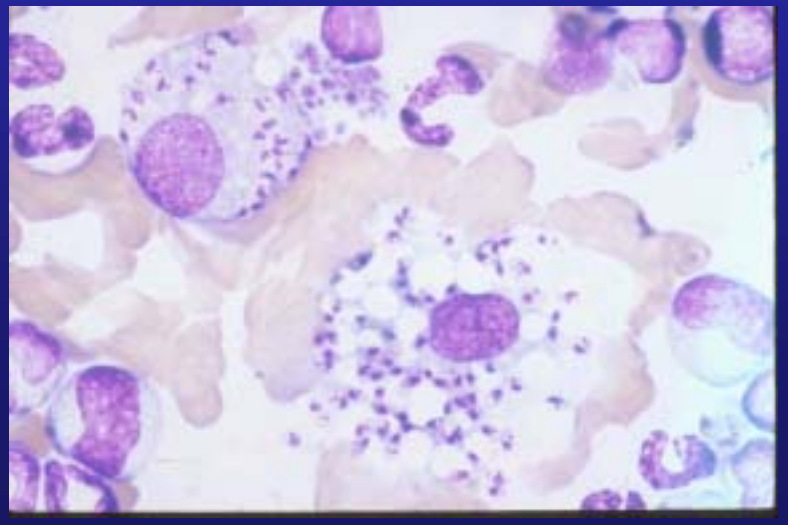
Diseases from pets

- 136M dogs and cats in U.S.
- 62M households with pets
- Increasing importance
  of human-animal bond

Bartonella henselae

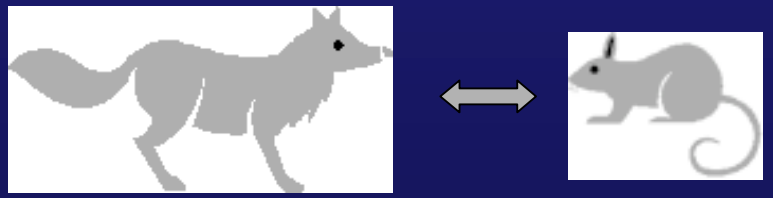
Capnocytophaga canimorsus

Yersinia pestis

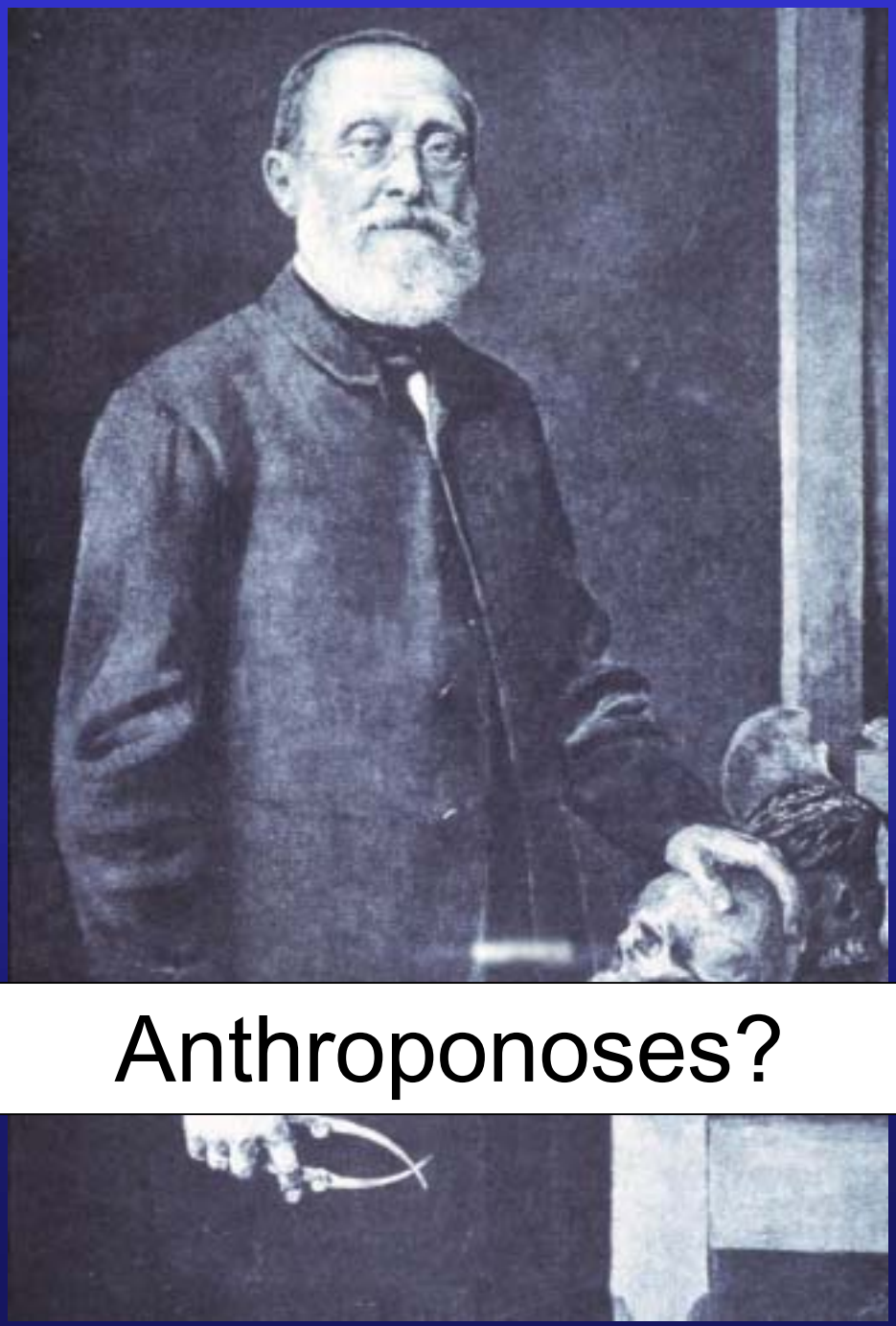


Leishmania spp.

Echinococcus multilocularis



Larson
DIDN'T WASH HANDS
MEN



Anthroponoses?

Anthroponoses?

- *Taenia solium*
- *Mycobacterium tuberculosis*
- *Giardia*
- MRSA
- Influenza

THE ROYAL SOCIETY

doi 10.1098/rstb.2001.0889

Diseases of humans and their domestic mammals: pathogen characteristics, host range and the risk of emergence

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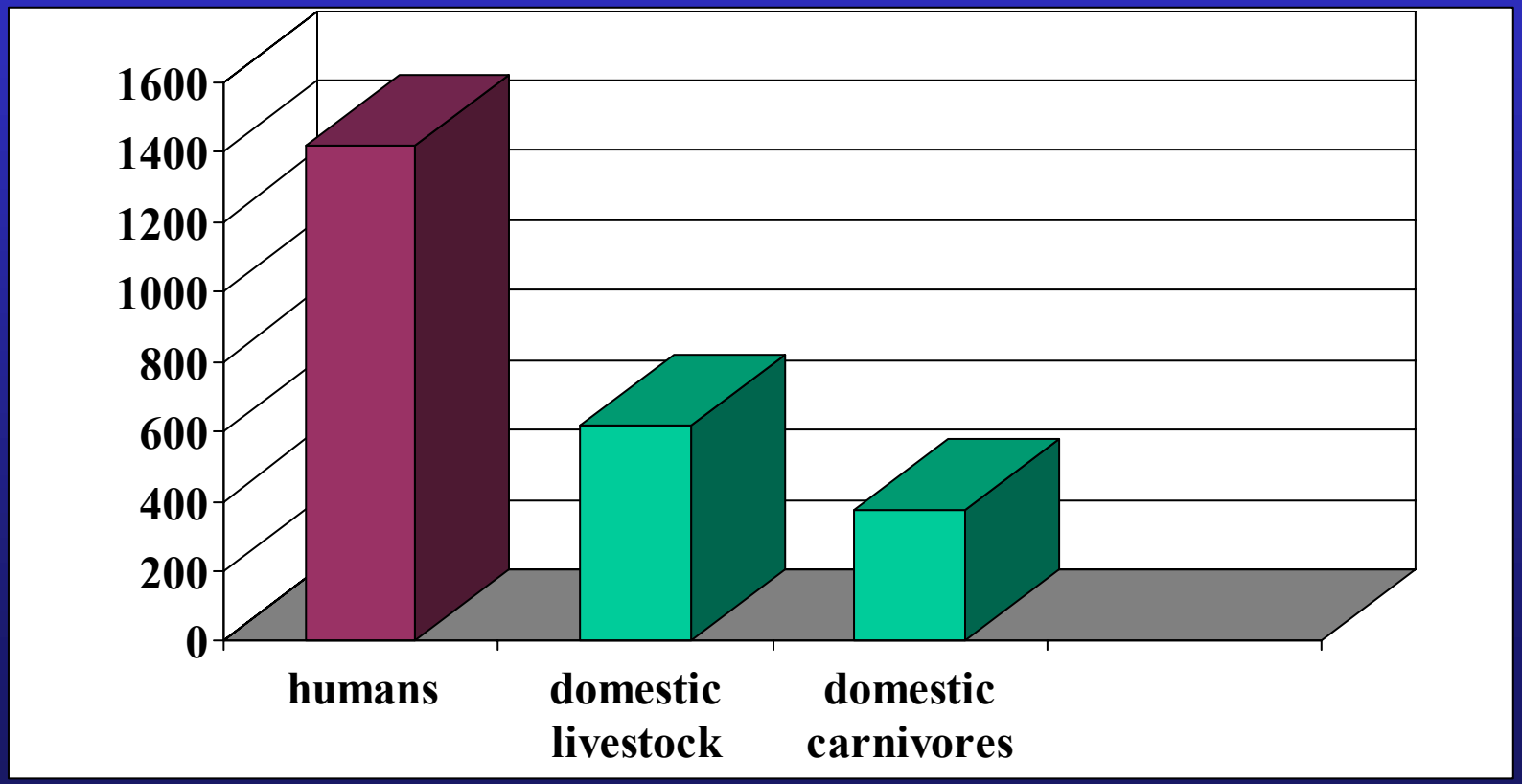
Centre for Tropical Veterinary Medicine, University of Edinburgh, Easter Bush, Roslin, Midlothian EH25 9RG, UK

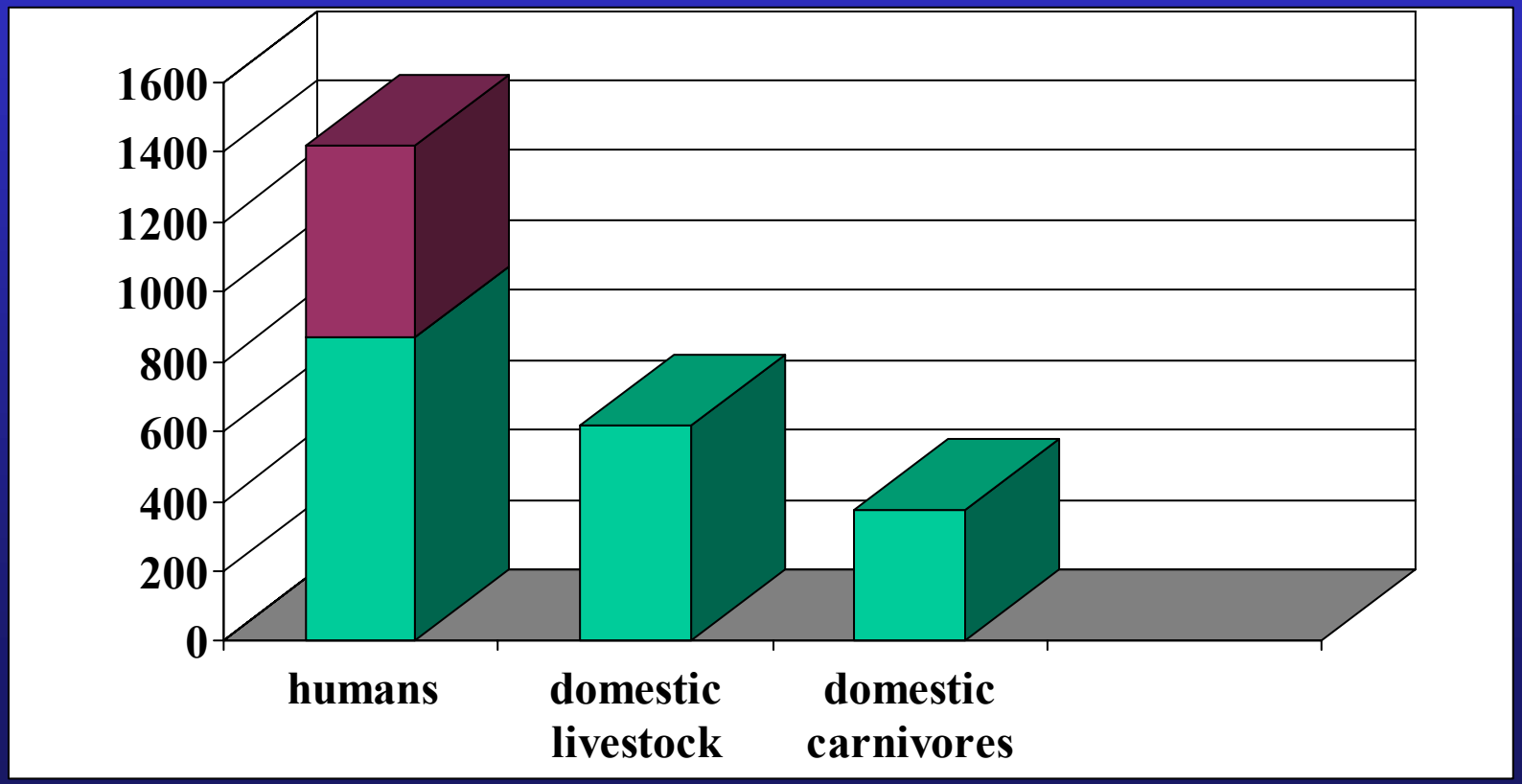
Pathogens that can be transmitted between different host species are of fundamental interest and importance from public health, conservation and economic perspectives, yet systematic quantification of these pathogens is lacking. Here, pathogen characteristics, host range and risk factors determining disease emergence were analysed by constructing a database of disease-causing pathogens of humans and domestic mammals. The database consisted of 1415 pathogens causing disease in humans, 616 in livestock and 374 in domestic carnivores. Multihost pathogens were very prevalent among human pathogens (61.6%) and even more so among domestic mammal pathogens (livestock 77.3%, carnivores 90.0%). Pathogens able to infect human, domestic and wildlife hosts contained a similar proportion of disease-causing pathogens for all three host groups. One hundred and ninety-six pathogens were associated with emerging diseases, 175 in humans, 29 in livestock and 12 in domestic carnivores. Across all these groups, helminths and fungi were relatively unlikely to emerge whereas viruses, particularly RNA viruses, were highly likely to emerge. The ability of a pathogen to infect multiple hosts, particularly hosts in other taxonomic orders or wildlife, were also risk factors for emergence in human and livestock pathogens. There is clearly a need to understand the dynamics of infectious diseases in complex multihost communities in order to mitigate disease threats to public health, livestock economies and wildlife.

Keywords: pathogen; epidemiology; emerging diseases; zoonoses; wildlife; multihost pathogen

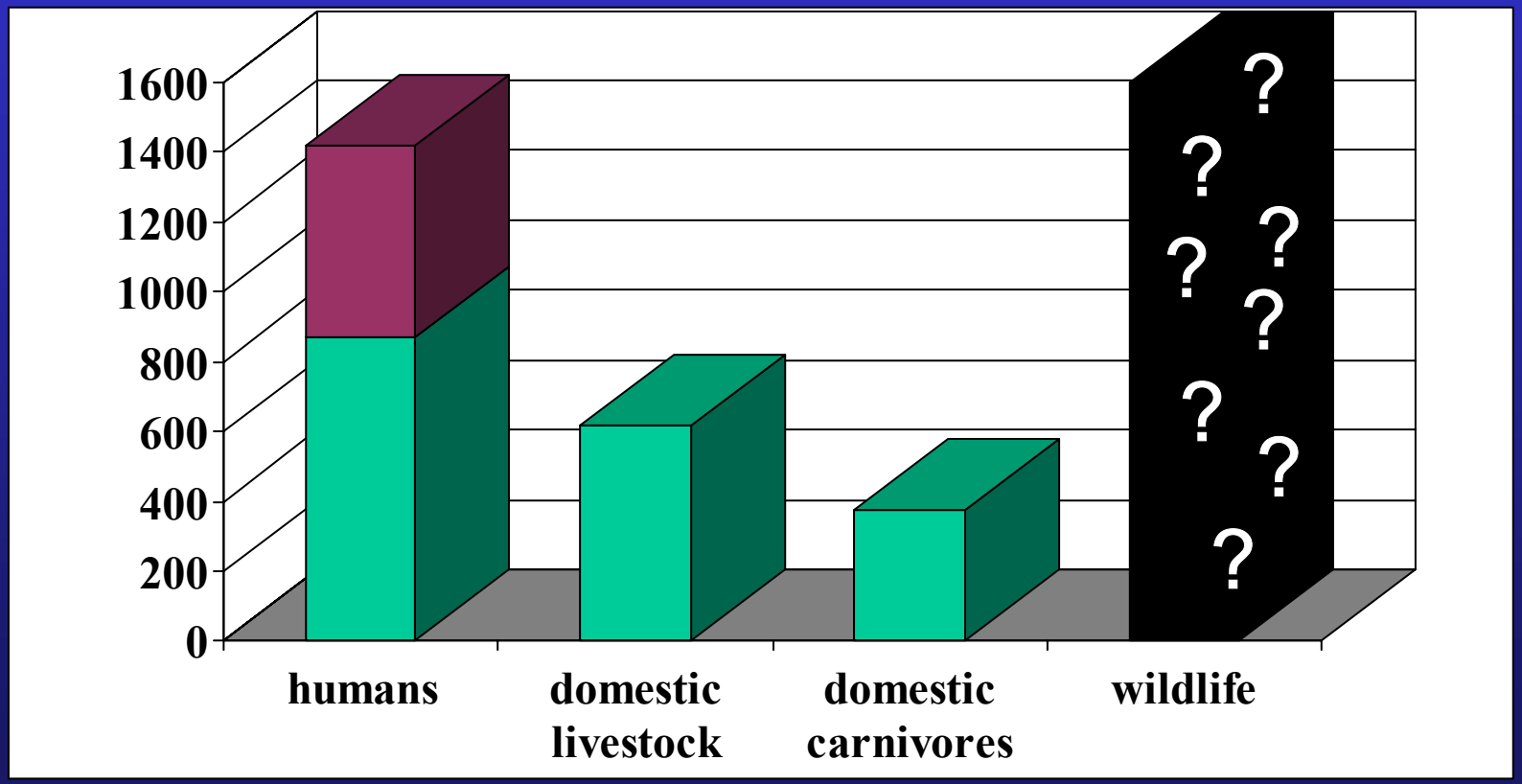
Numbers of Known Pathogens



Numbers of Known Pathogens

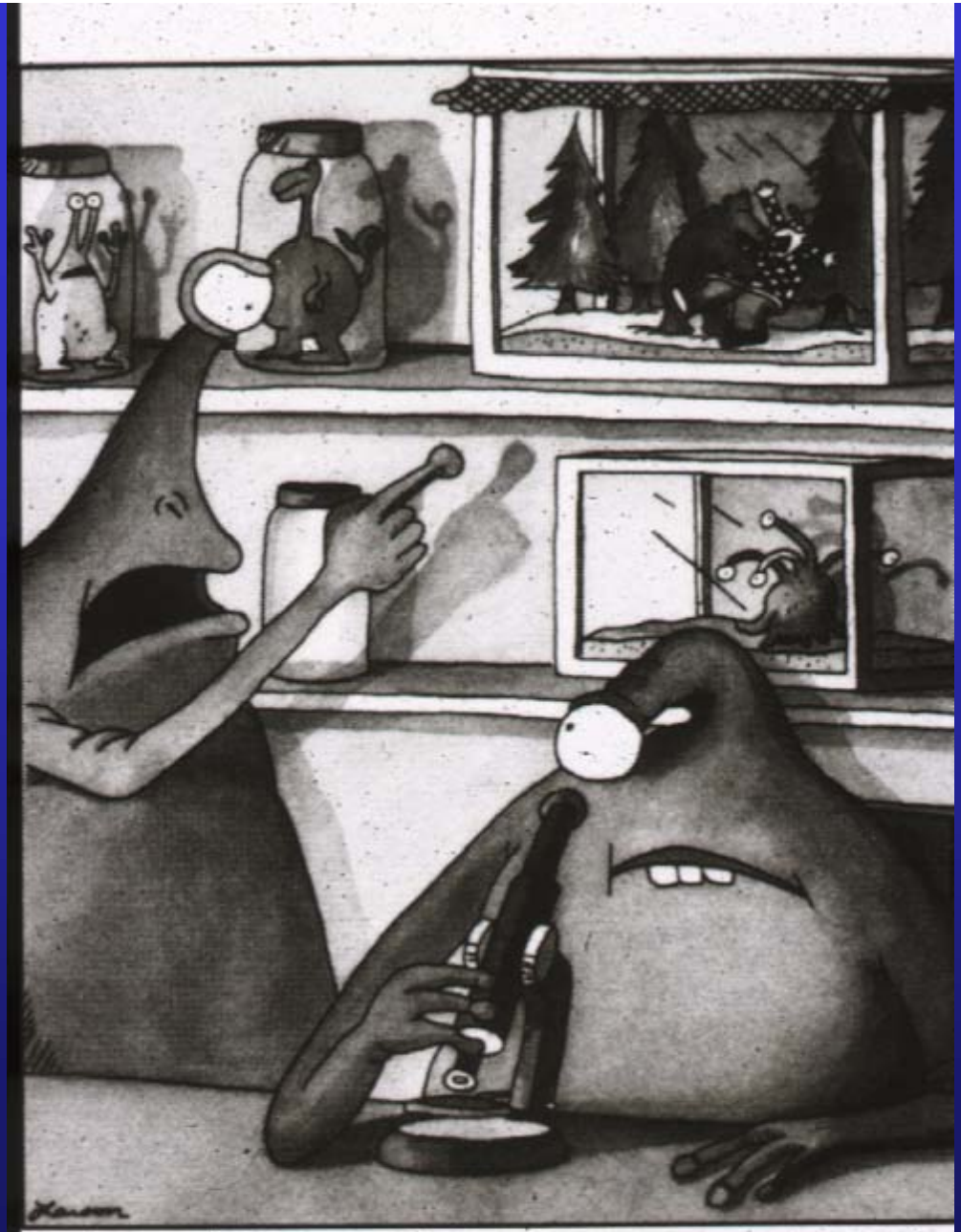


Numbers of Known Pathogens



ìWe can identify 0.4% of the bacteria in the human intestine.î

David Relman, 1997



"Zorak, you idiot! You've mixed incompatible species in the earth terrarium!"

The Interface of Animal and Human Health

- World population increase
- World population increase
- World population increase
- World population increase
- Decreasing habitat
- Cross-species transfer
- Husbandry changes
- Globalization

Globalization

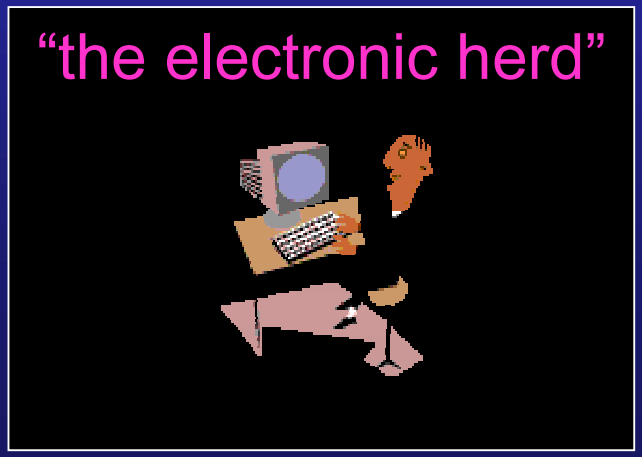
"an ongoing process characterized by the integration of markets, nations, and technology to create an interdependent, worldwide economy."

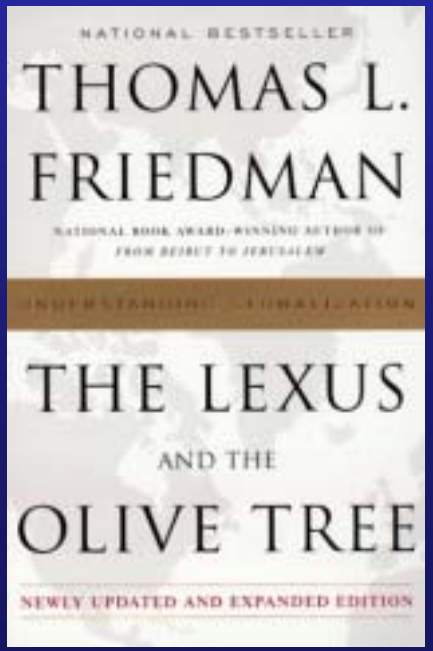
Globalization will have a greater impact on humanity than the Industrial Revolution

did 150 years ago.

3 keys to globalization

- Democratization of technology
- Democratization of information
- Democratization of finance

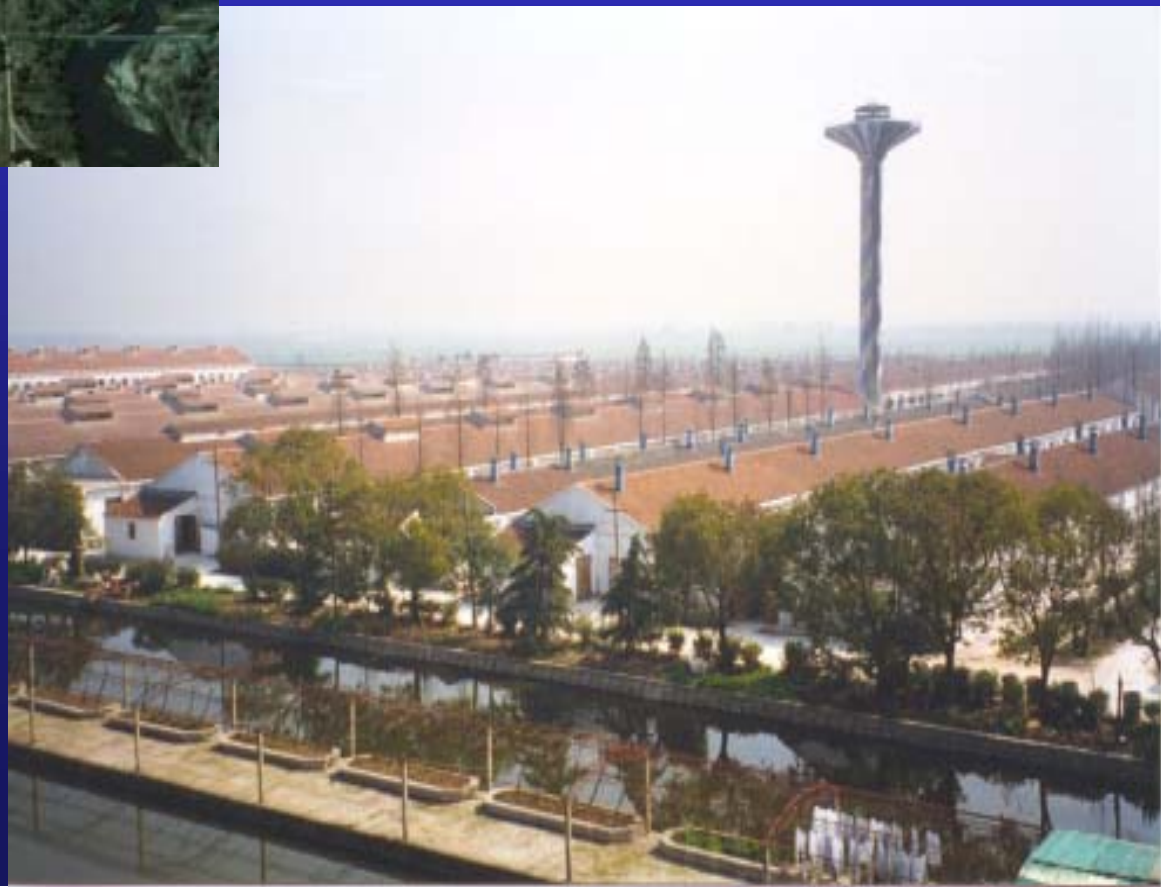




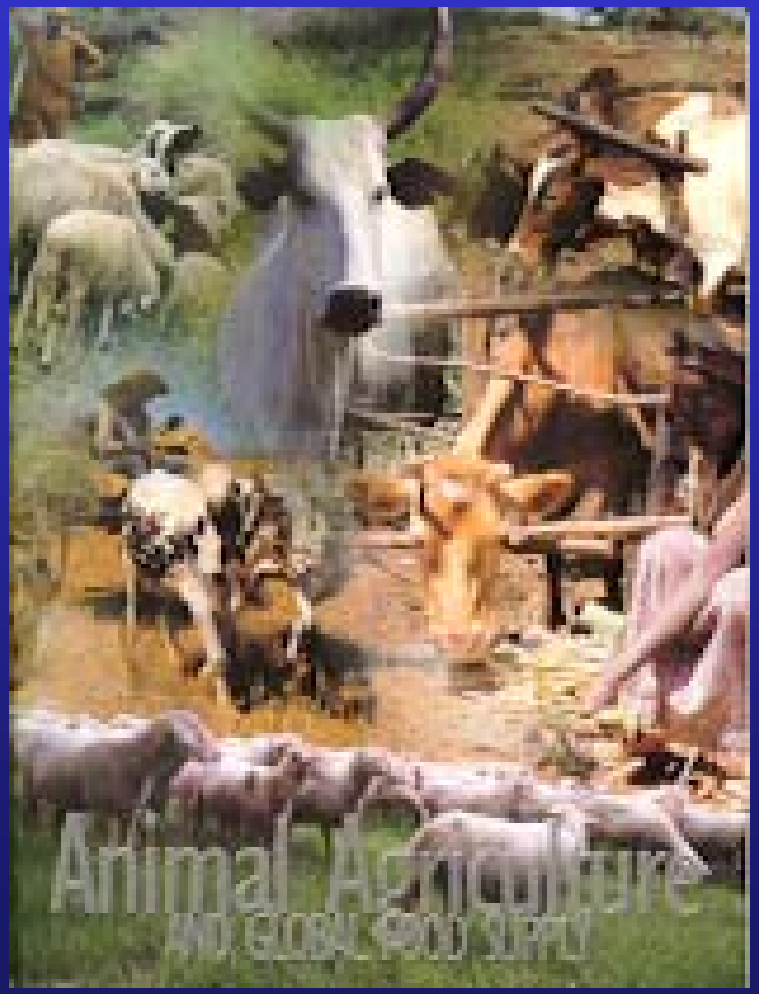
International Trade and Traffic

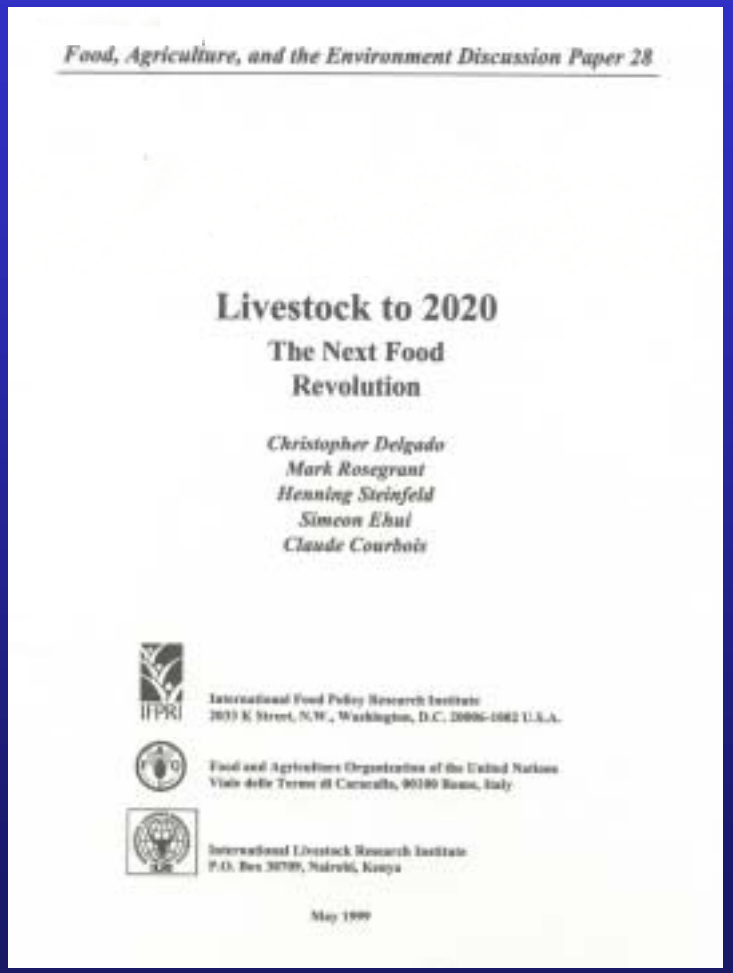
- World trade was $2.4 trillion in 1980, $8 trillion in 2000
- Exports climbing
  - Chicken meat 15X increase in 30 years
  - Dairy products 17X increase in 30 years
- Imports have increased 500% in last 10 years
- Tourism fastest growing sector of global economy
  - 700M international tourists in 2000
  - Each day, 1.3 million people enter the U.S., along with 38,000 animals

foreign diseases, public health



Predictions – Global Livestock Production





Food, Agriculture, and the Environment Discussion Paper 28

Livestock to 2020

The Next Food Revolution

Christopher Delgado
Mark Rosegrant
Henning Steinfeld
Simeon Ehui
Claude Courbois

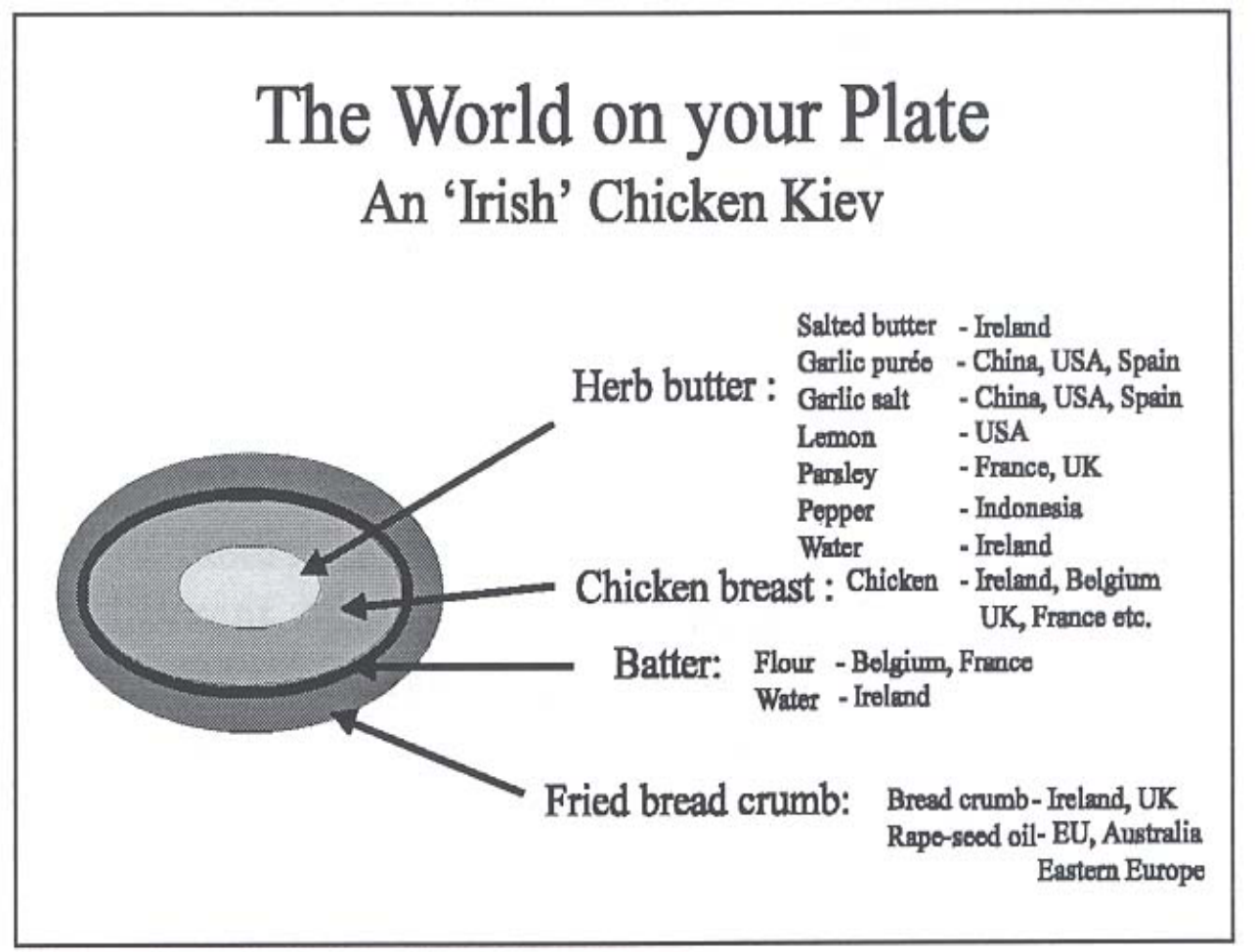
IFPRI
International Food Policy Research Institute
2033 K Street, N.W., Washington, D.C. 20006-1002 U.S.A.

Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla, 00100 Rome, Italy

International Livestock Research Institute
P.O. Box 30709, Nairobi, Kenya

May 1999

Processed Food - A Global Product



From W Anderson, *Br Med Bull*, 2000

First pants,
THEN
your shoes

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Bienvenue

Bienvenido

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29 5 2001

“Technical Item”
May 2001

- 158 member countries

QUESTIONNAIRE FOR PREPARING TECHNICAL ITEM I
OF THE 69TH GENERAL SESSION 28 May-1st June 2001

Rapporteur: Corrie C. Brown

Country: EGYPT

Name of Delegate: Prof. Dr. Hassan A.A. Aidaros

Date 7/10/2000

The importance of emerging diseases in animal and public health and trade

3

Definition of an emerging disease:
An emerging disease is defined as a new animal health problem, a new presentation of an old problem, or an existing disease that shows up in a new geographic area. As such, it encompasses both new entities as well as reemerging and transboundary diseases.

Recognition of emerging animal diseases

1. **Does veterinary services in your country have a separate unit for emerging issues in animal health?**

   √ Yes ☐ No

   If yes, what is the responsibility of this unit?

   The Epidemiology Planning Unit, its responsibility is for Disease monitoring and Serosurveillance.....

2. **Does responsibility for animal health in emerging animal disease situations rest at the national or regional level?**

   √ National ☐ Regional ☐ Shared

3. **What is your mechanism for detection of emerging diseases? (Check all that apply.)**

   √ anecdotal reporting from private veterinarians
   ☐ ad hoc reports from regional or federal diagnostic laboratories
   ☐ regular reports from regional diagnostic laboratories
   √ regular reports from federal diagnostic laboratories
   √ directed epidemiologic surveillance
   √ other, please specify Regular Reports from field epidemiologists.....

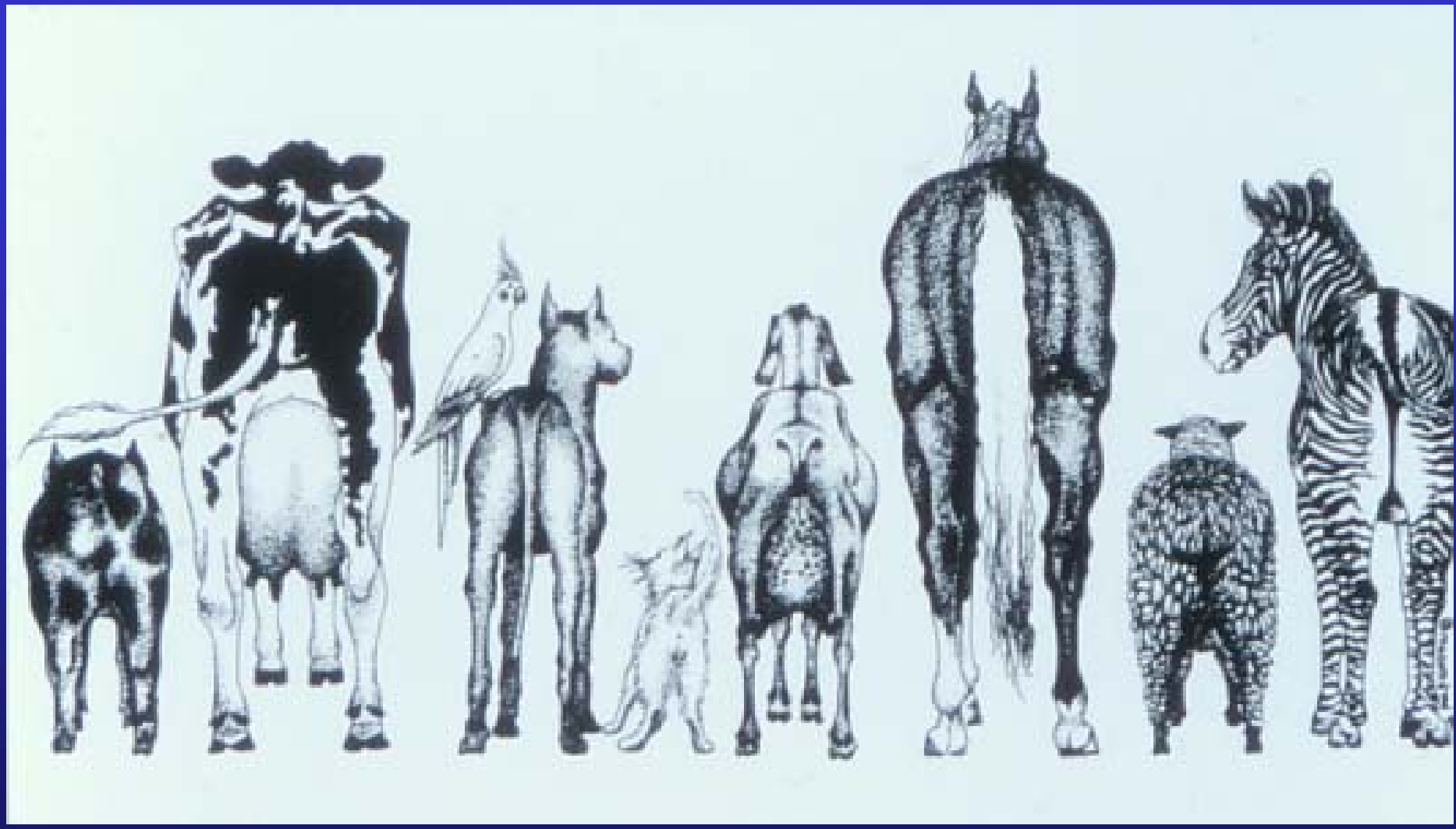
Emerging Diseases of Animals and Public Health

- 76% had a problem with emerging disease in last 5 years; two-thirds of these had multiple problems
- Total of 134 emerging diseases reported by responding countries;

Of these 134, 101 were associated with significant economic impact

Emerging Diseases of Animals and Public Health

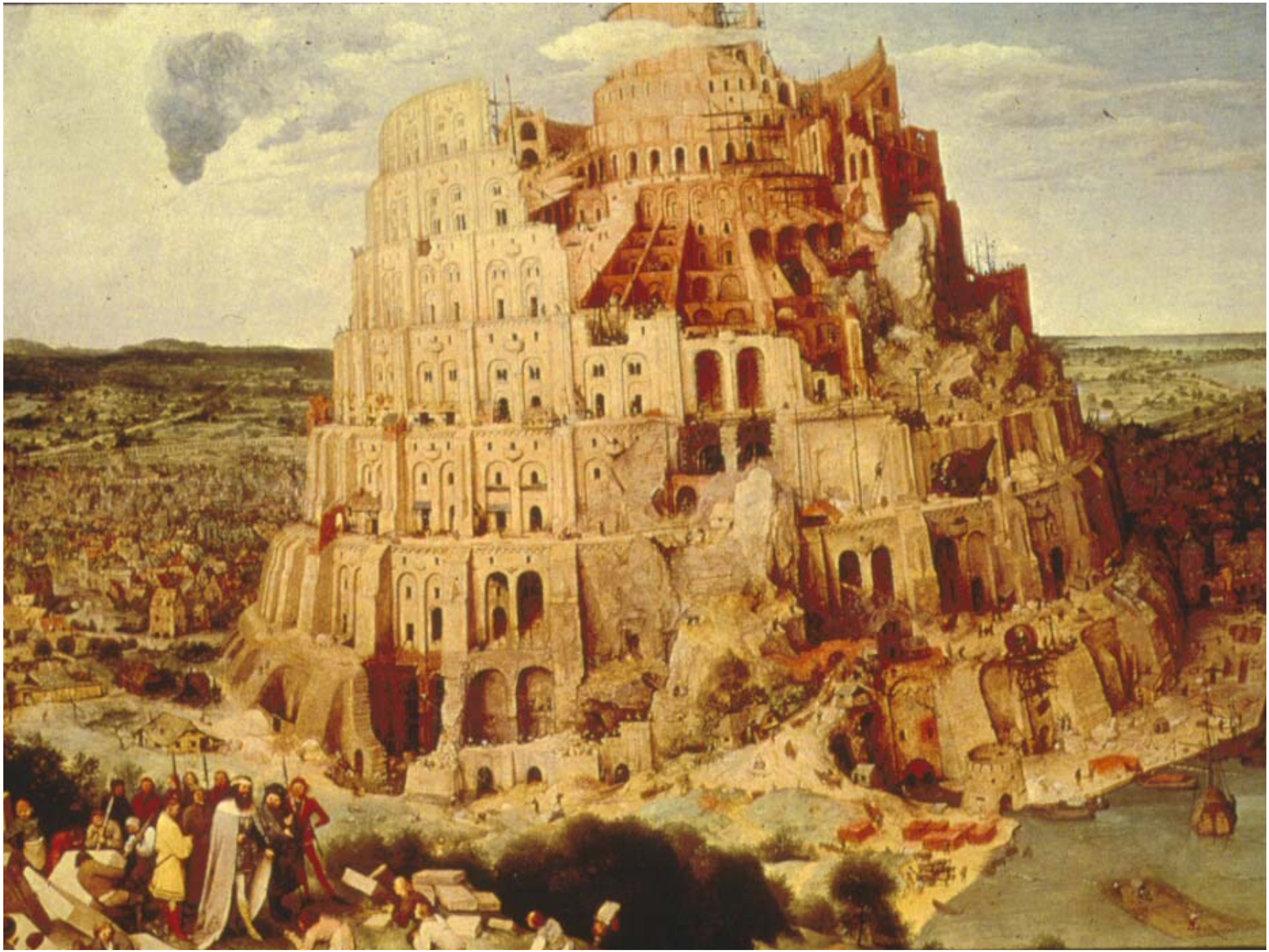
- Communication mechanisms varied widely
- Sharing of text exercises is inconsistent
- Only 50% have shared plans of emergency operation



Need expanded surveillance

- Human and animal health
- Domestic animals and wildlife

an integrated, coordinated, interdisciplinary approach for human health, agriculture and wildlife



“the end”

Thank you.