



Zoonosenforschung und Umsetzung in Deutschland im nationalen und internationalen Kontext

Marcel Tanner

Swiss Tropical and Public Health Institute,
www.swisstph.ch



Zoonotic and «one-health» -challenges -

SARS, Bird flu, H1N1, Hemorrhagic viruses (Ebola...) →

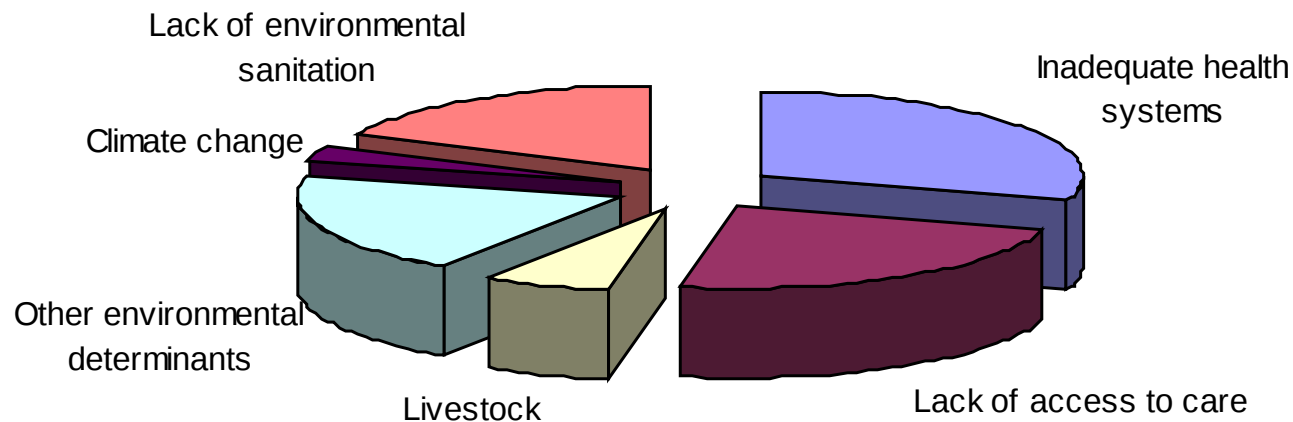
Zoonoses

Trypanosomiasis, Dengue, Buruli ulcer, ... → **Neglected diseases, re-emerging ↔ environment, often zoonoses and associated with social and political changes**

**Neglected diseases
Neglected people and animals
Neglected health and social systems**

**1400 pathogens 800 cross barrier animal-humans
24 % of diseases clear environmental links**

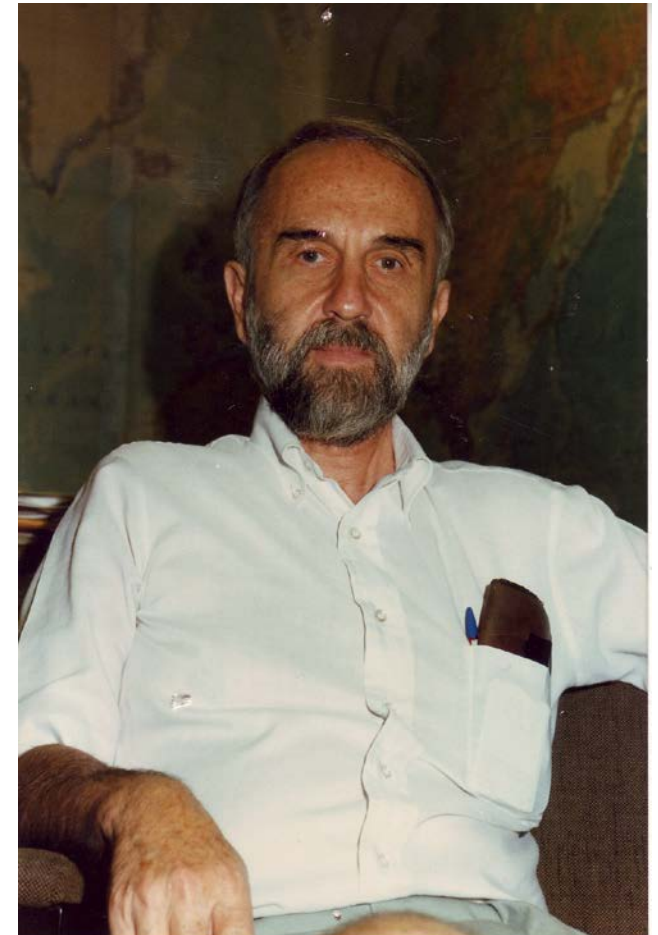
Approximate composition of determinants of health: Incremental contribution of climate change to the overall determinants of health



The „**one medicine**“ by **Calvin Schwabe**'s has its origins in his work with Dinka pastoralists in Sudan in the 1960s

„There is no difference of paradigm between human and veterinary medicine. Both sciences share a common body of knowledge in anatomy, physiology, pathology, on the origins of diseases in all species.“

Schwabe C. (1964, 1984 3rd Edition):
Veterinary Medicine and Human Health.
Williams and Wilkins, Baltimore



What does Calvin Schwabe's „one medicine“ really mean?

1. Recognition of interdependence of humans and animals is only part of one medicine and one health. It is necessary but not sufficient.
2. Most of the papers in conferences are limited to this aspect, some include broader interactions.
3. Little theory of “One health”, an operational definition could be that:
4. “One health” is **anything that adds value** to the health of animals and humans, or economic savings, not achievable without cooperation of the two medicines.



One-Medicine - Related concepts

Veterinary Public Health (VPH)

1. Contribution of veterinary sciences to Public Health (WHO): classical zoonoses, food-borne diseases, new emerging diseases.

Natural Nidality of Transmissible Diseases

1. E. Pavlovsky (1966): Concept of “disease nidality”: Pathogens occupy ecological niches much in the same manner as any living organism has a characteristic niche in nature

Ecosystem health (IDRC)

1. Vision of improved health and well-being, sustainable ecosystems, more equitable development and less poverty.

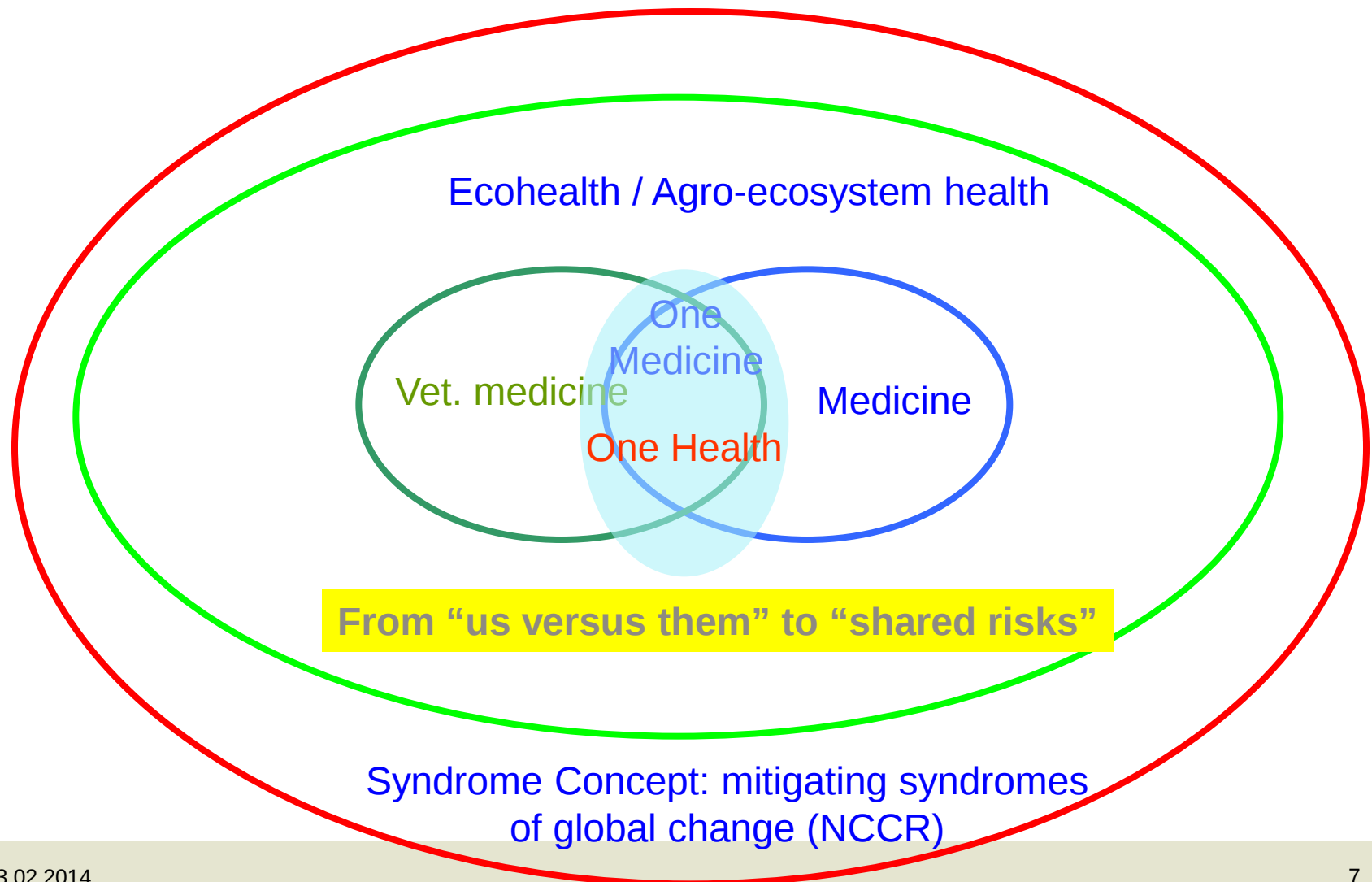
Agro-ecosystem Health

1. Investigation of agricultural **systems** in holistic view encompassing ecology, economy and health

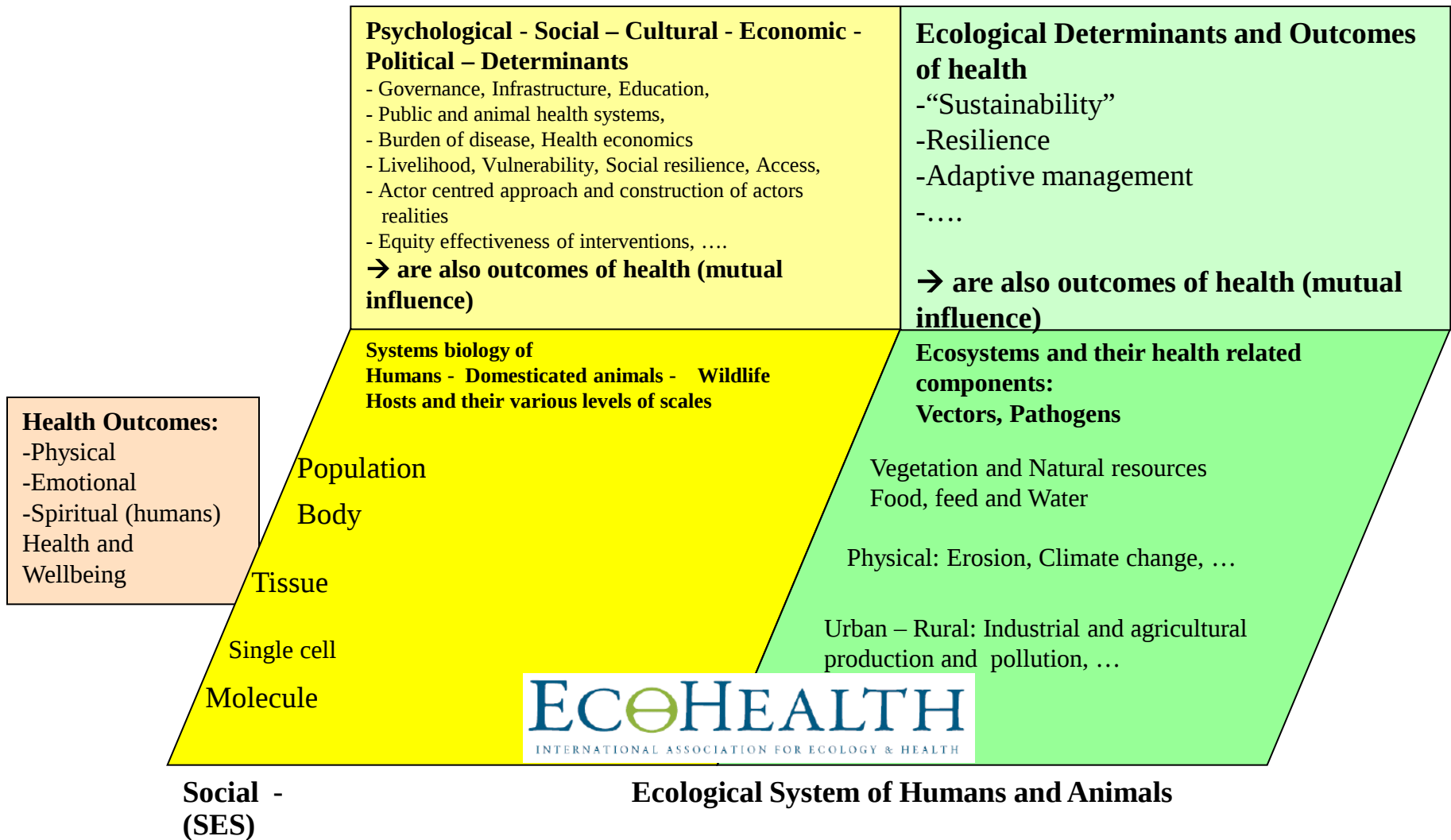
Extension of health concept to whole ecosystem

- From “one medicine” to “**one health**” and possibly “**one well-being**”

Conceptual landscape of „one medicine“



.... to Health in Social-Ecological Systems (HSES)
(Zinsstag et al. PVM, 2011)



A step towards a „theory of development research“
→ Communication with non–Western Epistemologies



Descriptive studies on zoonoses: Q-fever, Brucellosis

Methodology: HDSS for mobile populations

Health systems and interventions: Vaccination services in Sahel

Urban zoonoses: Rabies elimination through vaccination of dogs

Economic benefit and interventions: Brucellosis central Asia/Mongolia, rabies

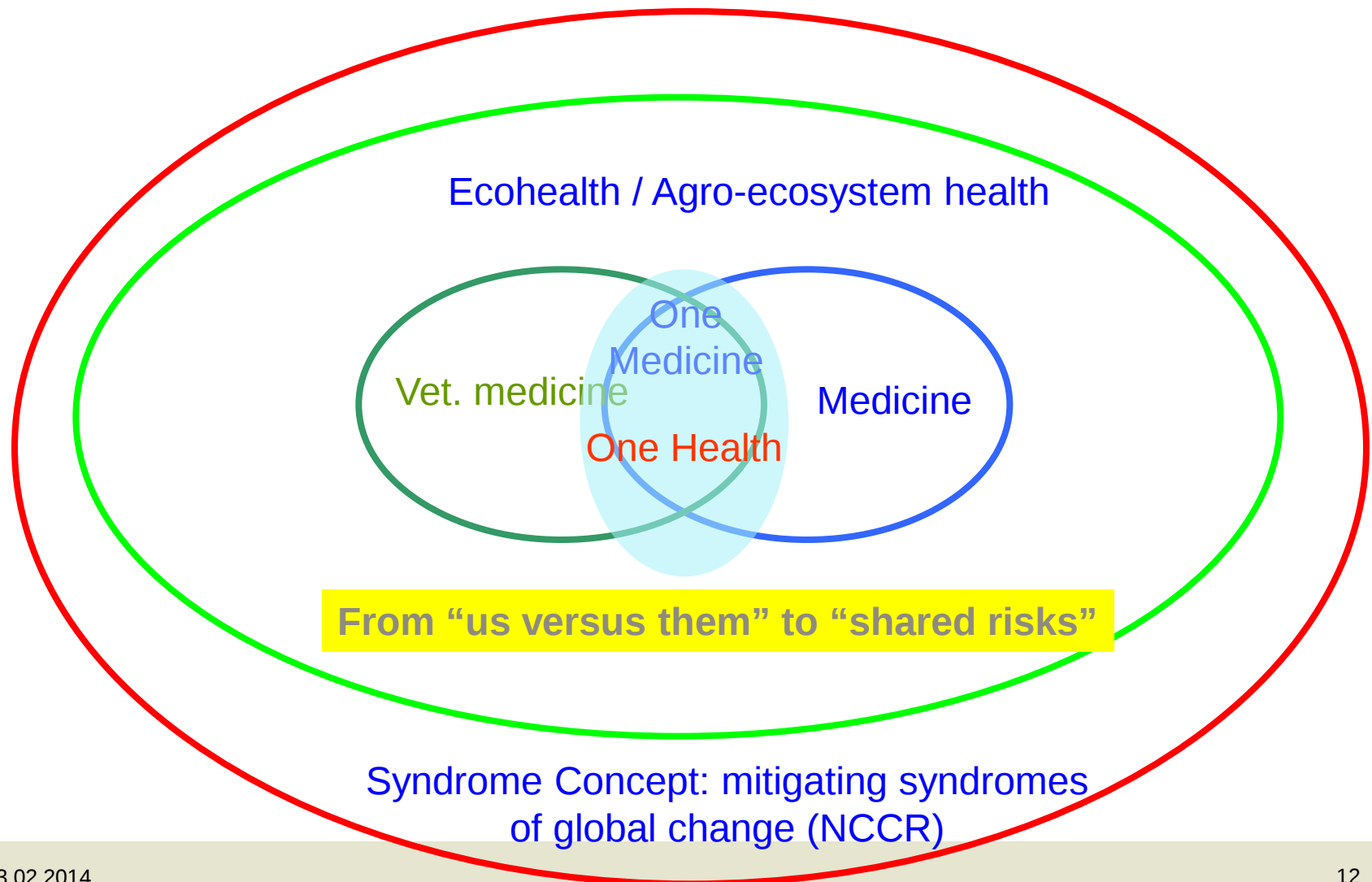


Joint human and animal disease surveillance

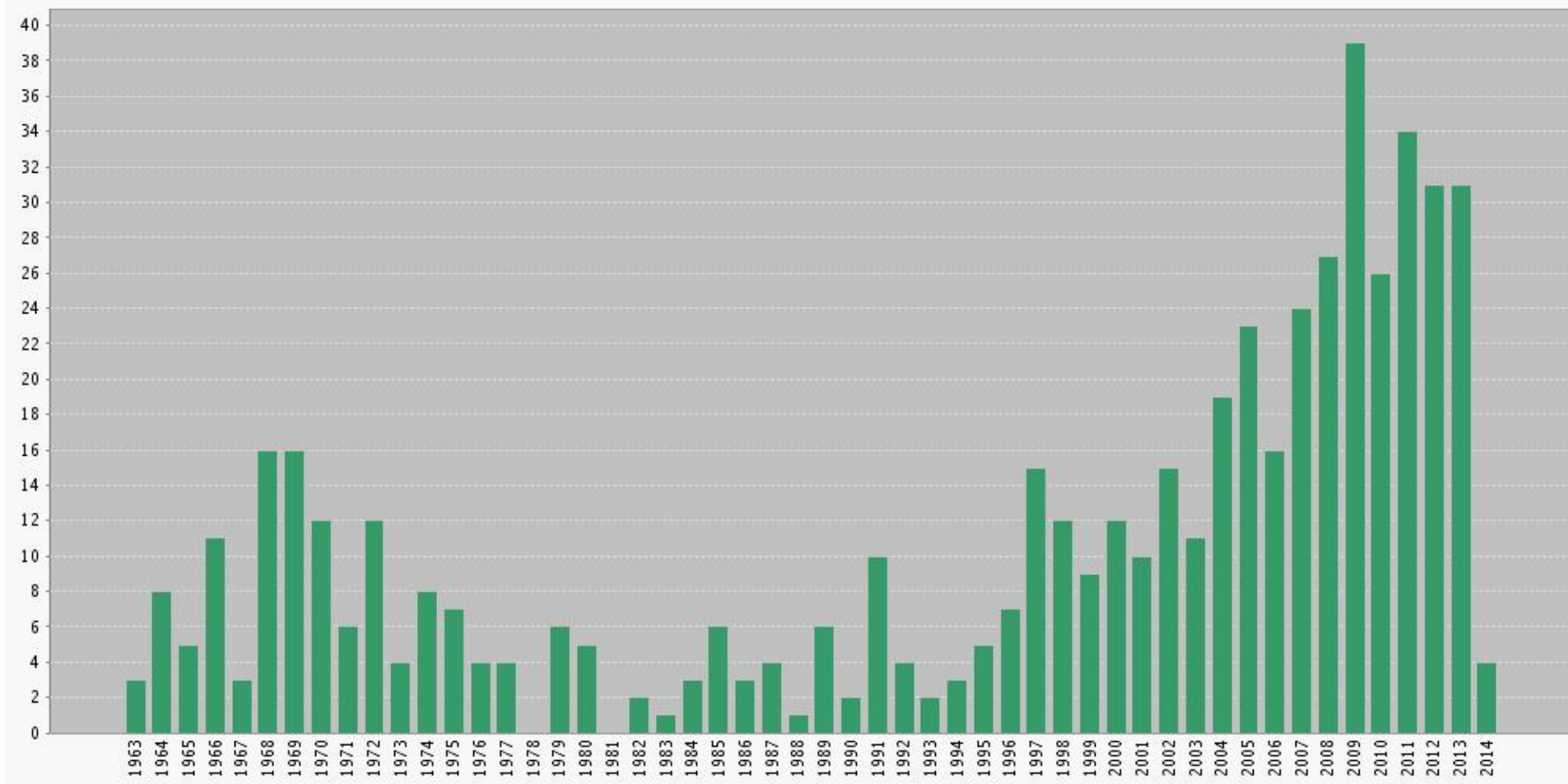
11 Verbundprojekte (Zoonosenverbünde) mit über 95 Teilprojekten gefördert:

- **FBI-Zoo** - Lebensmittelbedingte zoonotische Infektionen beim Menschen
- **FluResearchNet** - Pathogenität und Speziestransmission von Influenza A-Viren
- **Lyssaviren** - eine potentielle Gesundheitsgefahr
- **MedVet-Staph** - Interdisziplinäres Forschungsnetzwerk zur zoonotischen Bedeutung von *Staphylococcus aureus* / MRSA
- Pathogenese, Diagnostik und Epidemiologie des **Q-Fiebers** in Deutschland
- **RESET** - Resistenzen bei Tier und Mensch - gemeinsame Forschung in Deutschland
- **SARS** - Ökologie und Pathogenese einer archetypischen Zoonose
- **Toxonet02** - Ein Netzwerk zur Toxoplasmose bei Mensch und Tier in Deutschland
- **VibrioNet**: Vibrio-Infektionen durch Lebensmittel und Meerwasser in Zeiten des Klimawandels
- **ZooMAP** - Paratuberkulose: Von der Johne'schen Krankheit zum Morbus Crohn
- **Zoonotische Chlamydien** - Modelle für chronische und persistente Infektionen bei Mensch und Tier

Conceptual landscape of „one medicine“

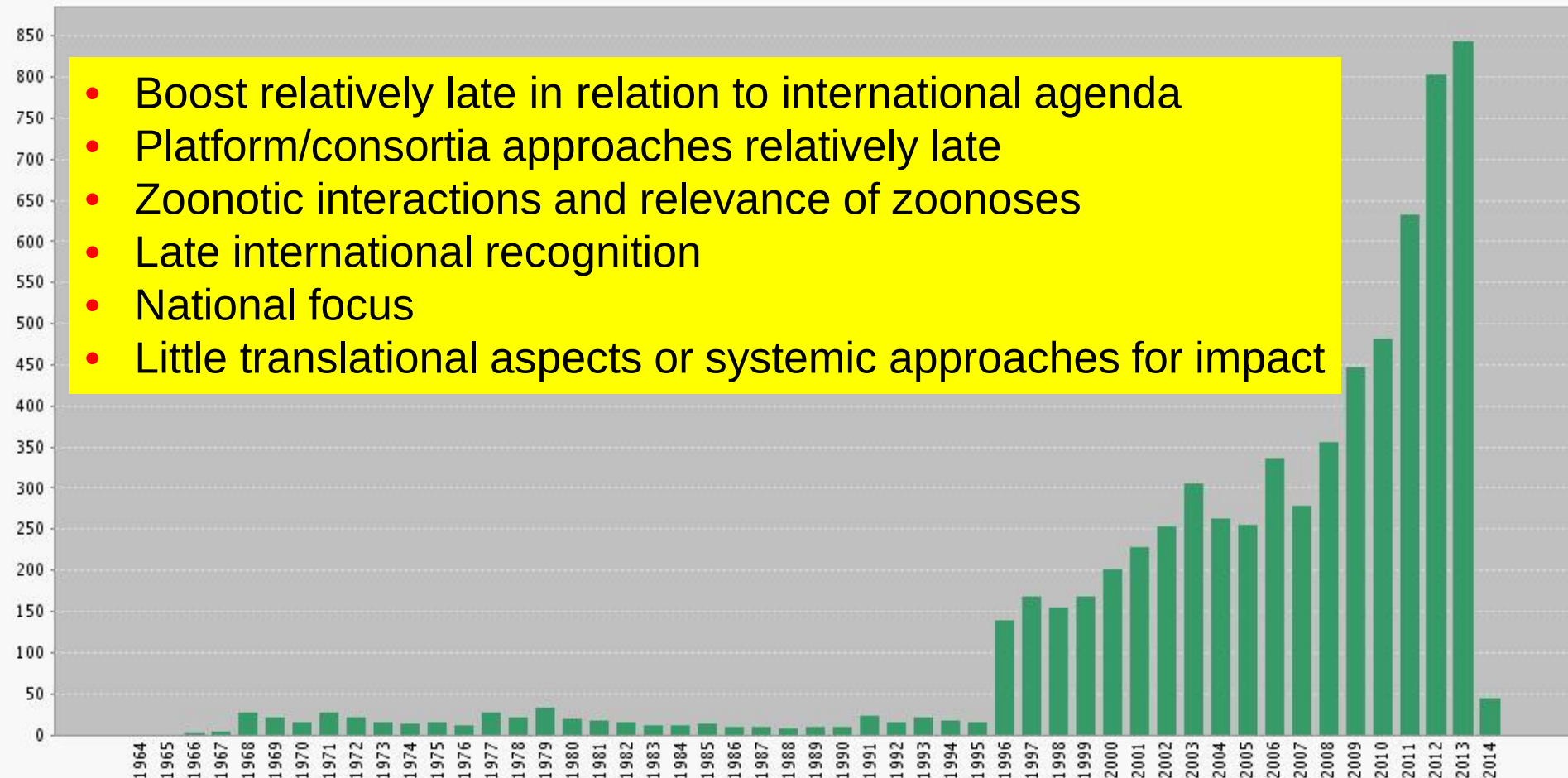


Publications: Zoonoses - Germany



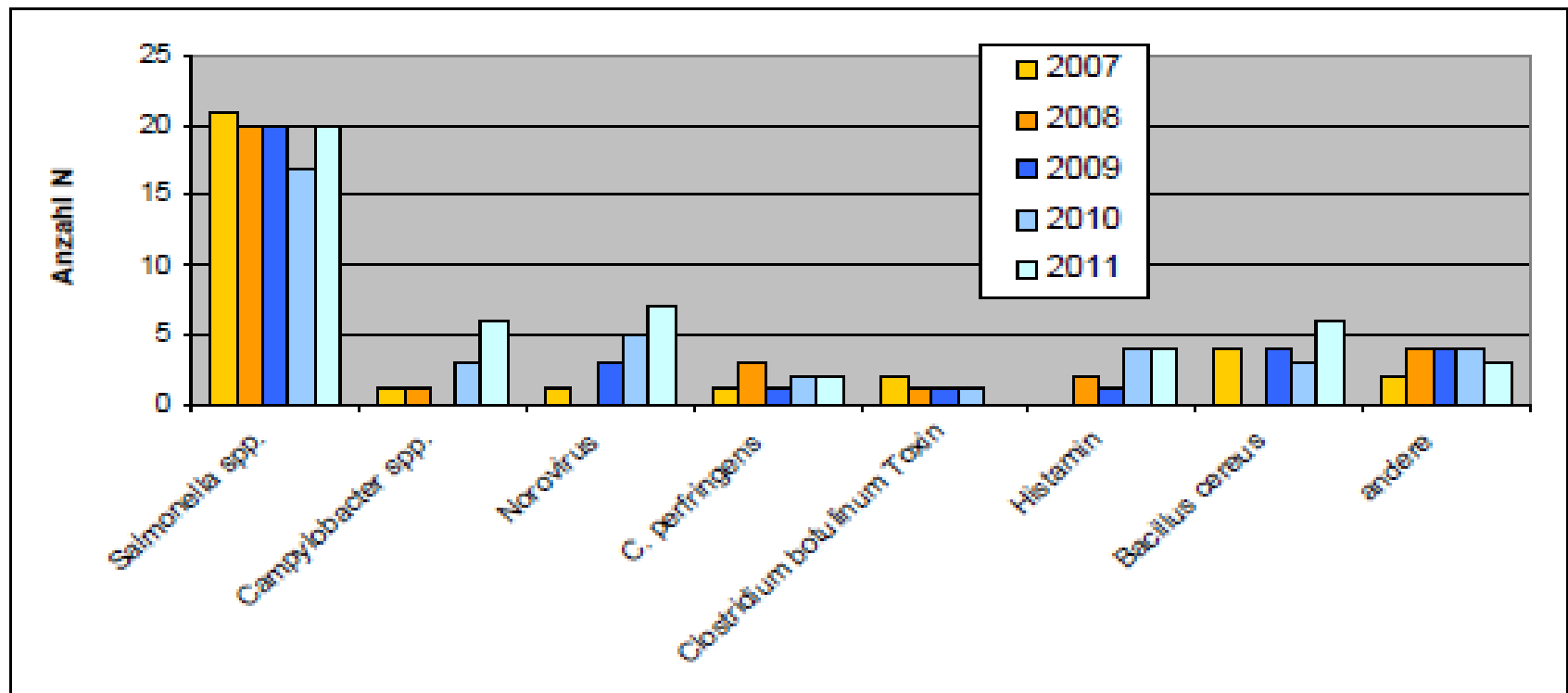
Zoonoses - Germany: Citations and consequences

- Boost relatively late in relation to international agenda
- Platform/consortia approaches relatively late
- Zoonotic interactions and relevance of zoonoses
- Late international recognition
- National focus
- Little translational aspects or systemic approaches for impact



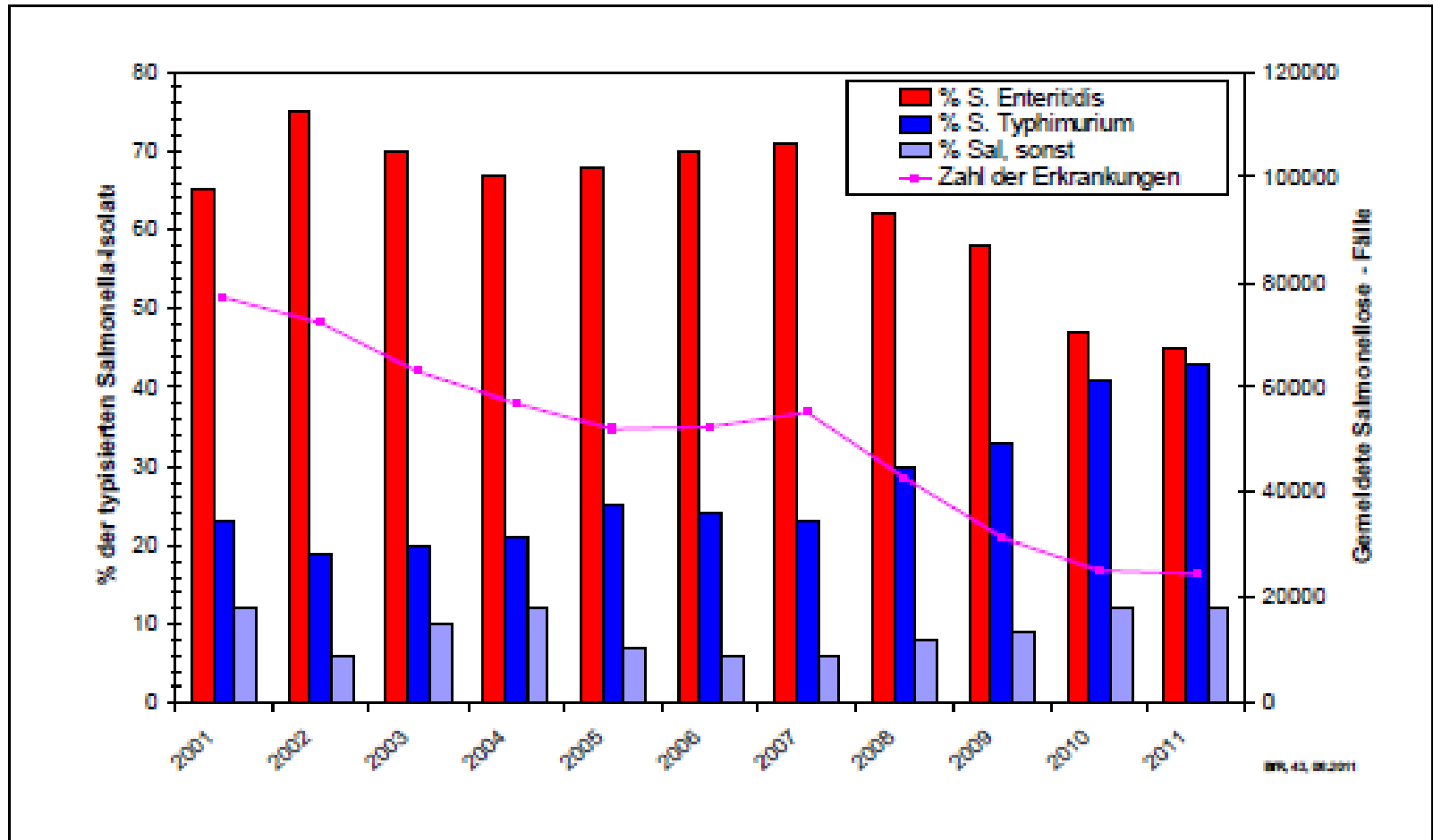
Foodborne outbreaks 2007 - 2011

Abb. 4.1.1: Anzahlen der gemeldeten lebensmittelbedingten Ausbrüche mit hoher Evidenz pro Erreger in den Jahren 2007 bis 2011



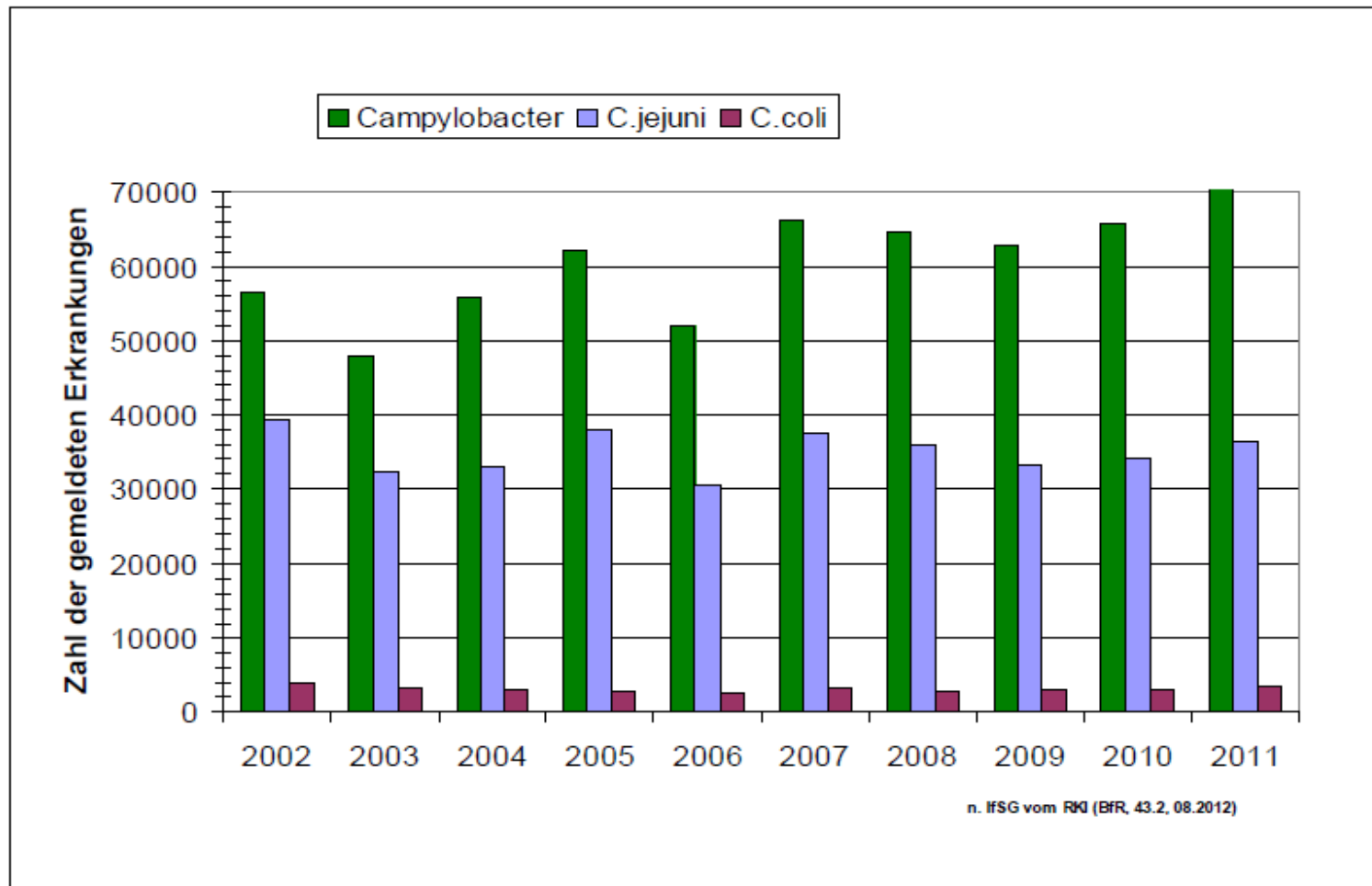
Salmonella 2001 - 2011

Abb. 4.2.1: Dem RKI gemeldete Fälle von Salmonellose beim Menschen 2001–2011 (n. RKI, 2012: nach IfSG)



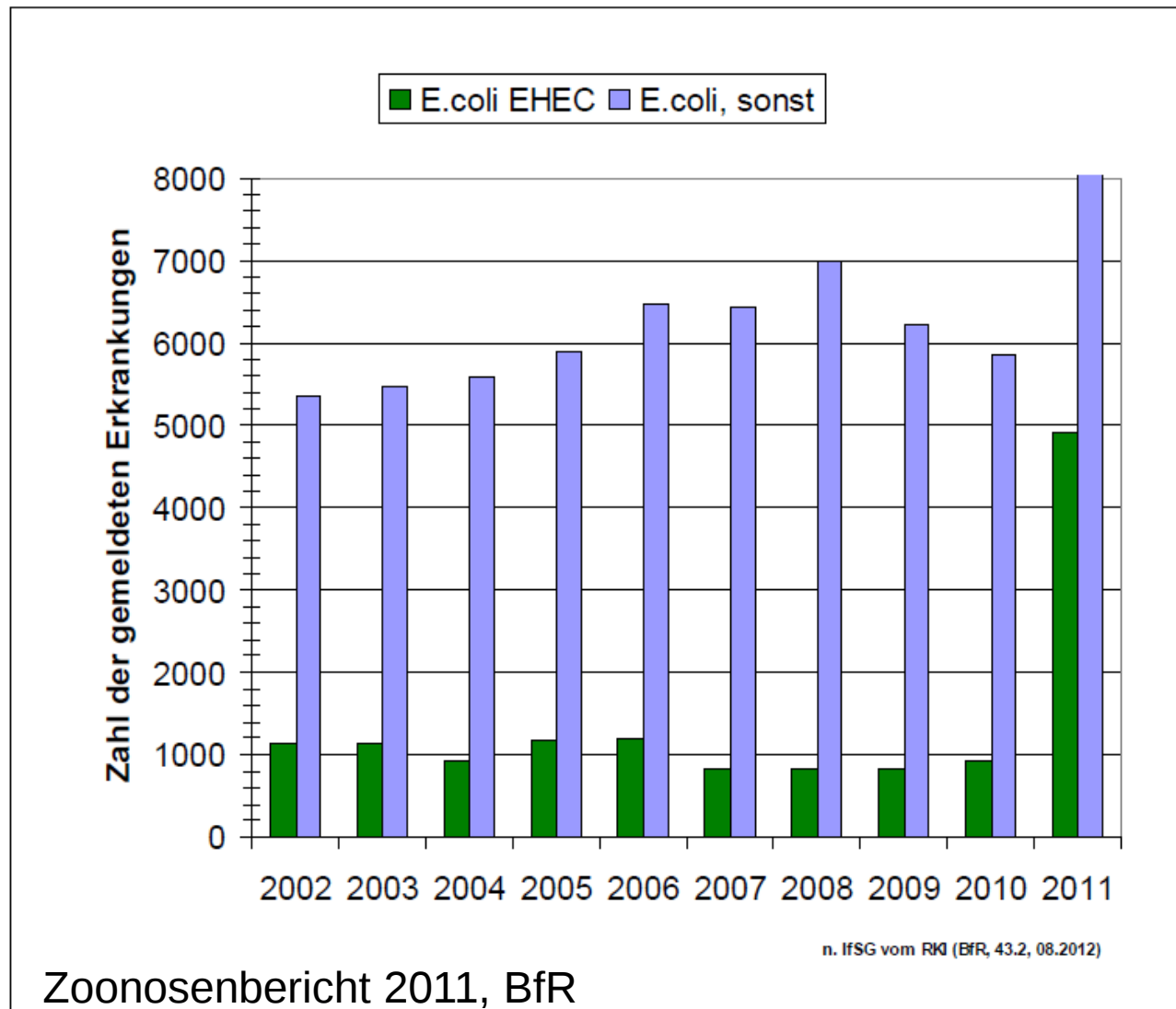
Campylobacter 2002 - 2011

Abb. 4.3.1: *Campylobacter*-Infektionen beim Menschen 2002–2011 (Quelle: RKI, 2011)



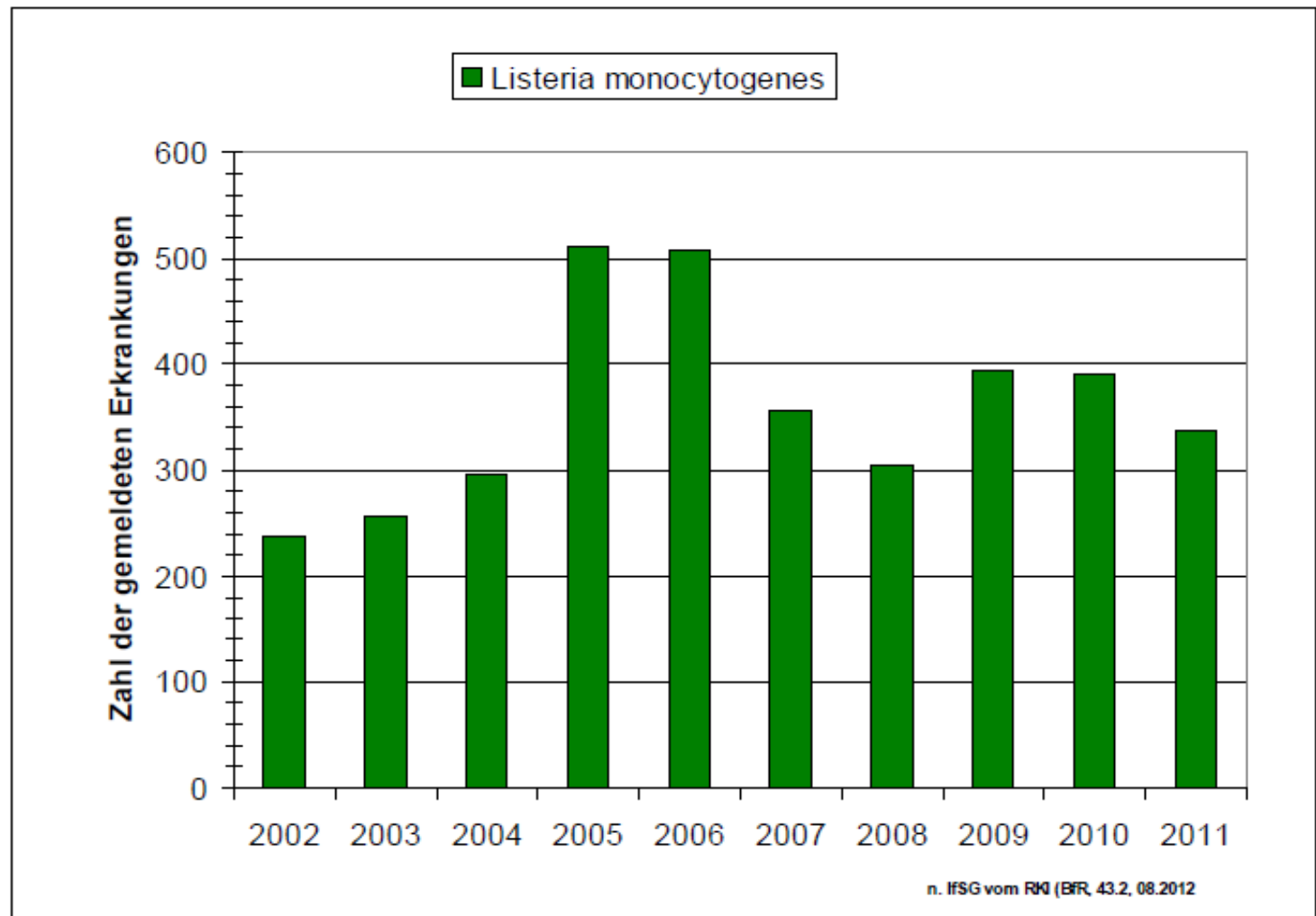
EHEC 2002 - 2011

Abb. 4.4.1: *E. coli*-Infektionen (EHEC) sowie sonstige *E. coli*-Infektionen beim Menschen 2002–2011

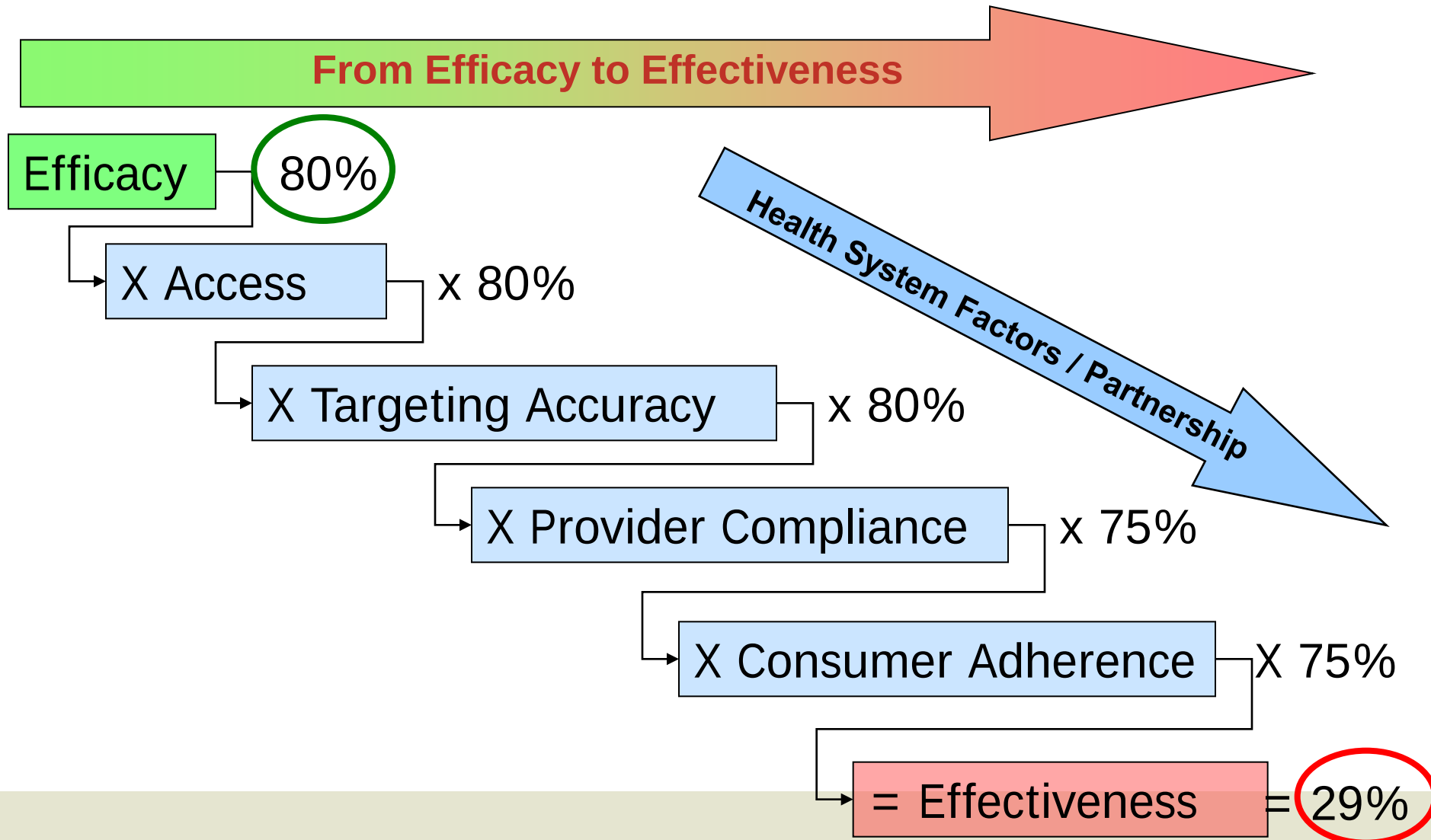


Listeria 2002 2011

Abb. 4.6.1: Vorkommen von Infektionen mit *Listeria monocytogenes* beim Menschen 2002–2011

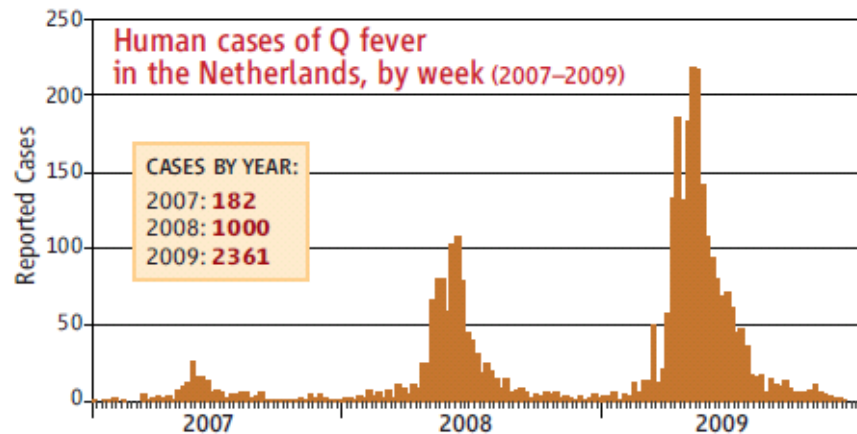


The systems context



Q-fever in the Netherlands (2007)

Enserink M. (2010) Science (327) 266-267.



Rising tide. The number of human Q-fever cases exploded in the past 3 years, and the disease, originally concentrated in the south, spread north and east.

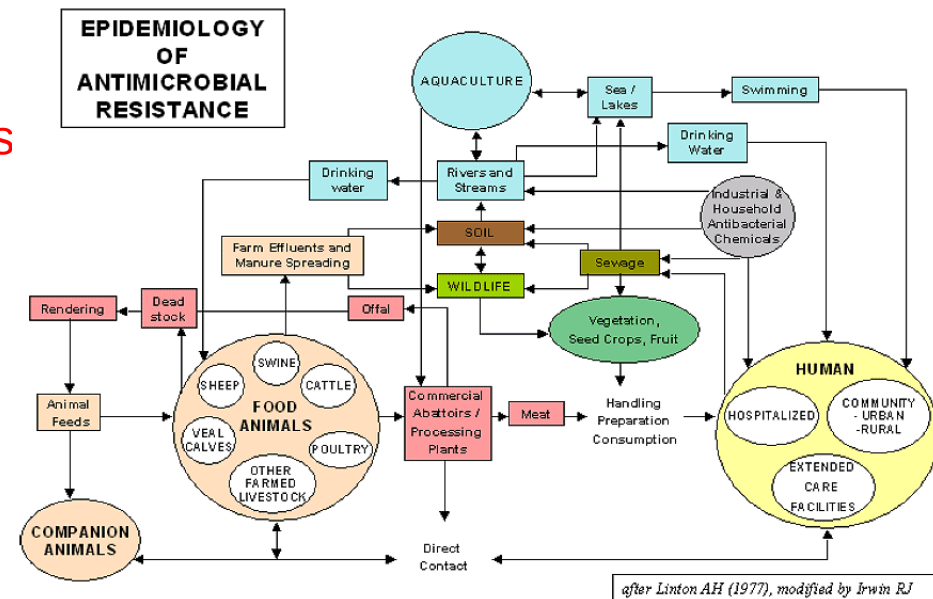
But the Dutch Q-fever outbreak provides a vivid example of how those two worlds often don't get along, especially when the stakes are different for each. Public health officials have complained that the veterinary community didn't properly inform them and that the outbreak spiraled out of control in part because economic interests trumped human health. "Sure, One Health, it's a nice concept, but we clearly have a long way to go," says Roel Coutinho, head of the Centre for Infectious Disease Control.

Lack of communication between Veterinary and Public Health sectors

Key actions: The unfinished “One Health”

(Zinsstag et al. 2009 Veterinaria Italiana)

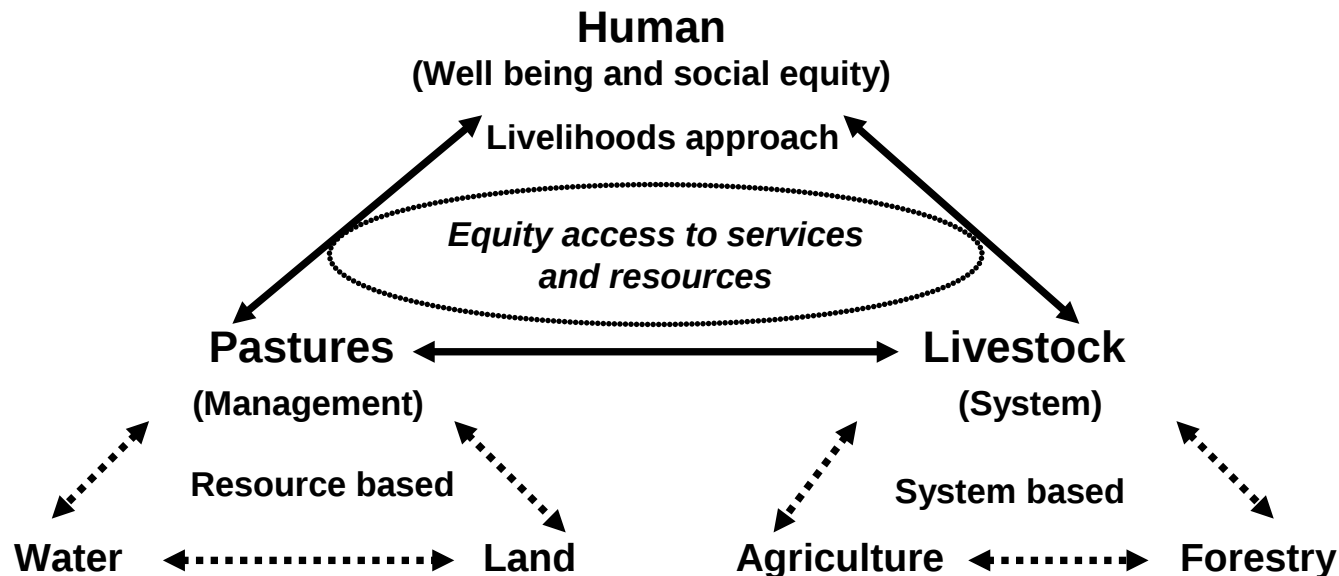
1. Joint disease surveillance humans and animals (Labs and IT)
2. Joining cancer registries for humans and animals
3. Joint surveillance of antimicrobial resistance (e.g. CIPARS, Canada)
4. Better use of the human-animal bond for the control of non-communicable disease like depression or obesity. Communication: It should just become normal that doctors and veterinarians work together as closely as possible.
5. Worldbank estimates > 6 Billion USD annual savings from closer cooperation between human and animal health in infrastructure, institutional reform and communication (2011).



Zoonoses and „One health“ today and in future

1. Comparative Pathology
2. Joint human and animal epidemiological studies
3. Human health benefits of interventions in animals
4. Joint human and animal health services
5. Joint surveillance: risks, antibiotic resistance...
6. Joint systemic approaches – incl. population dynamics

Surveillance as intervention / surveillance – response approaches





Towards living „one health“

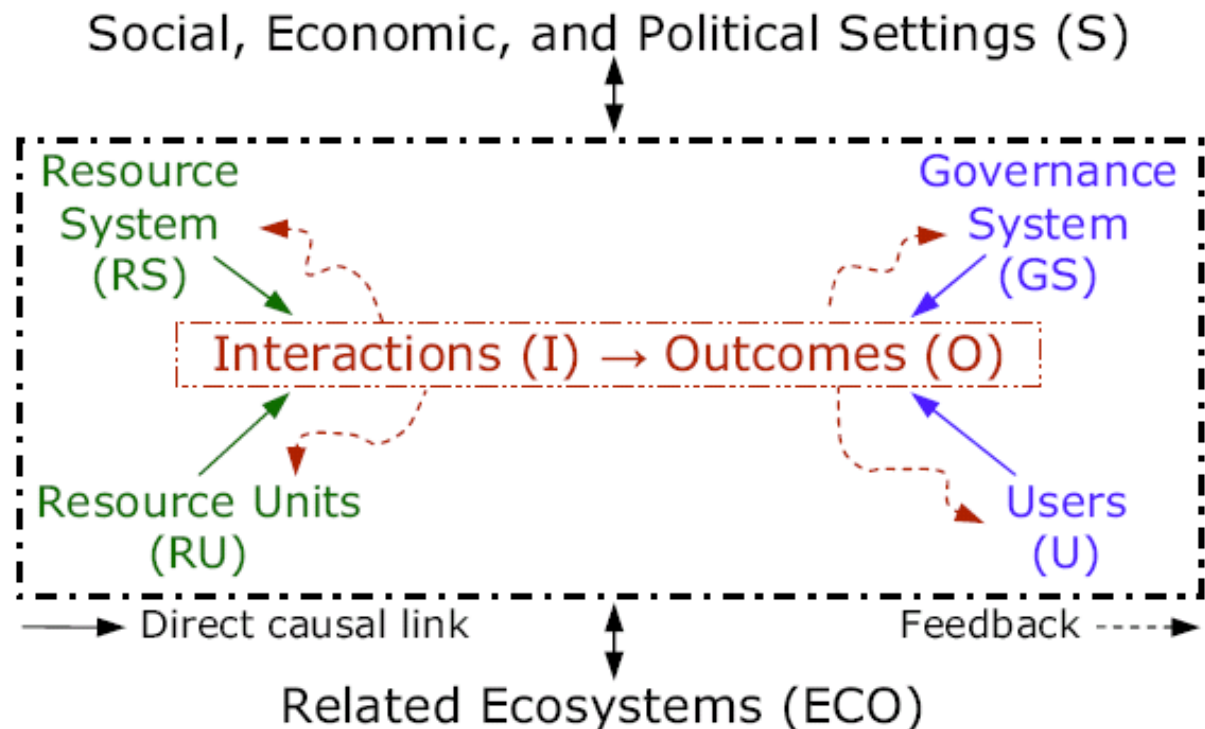
- Integrated human and animal disease surveillance
 1. Demographic Surveillance Systems, including community surveillance leading also to cost savings
- Integrated human and animal epidemiological study design.
- Integrated human and animal health services provision
- Institutional reform and public health reforms including communication

Germany:

- Extend scope to systemic and transdisciplinary approaches
- Pursue translational medicine and translational public health concept – including surveillance and forecasting in a decentralized system:
- Become truly international: From approaches (questions, consortia) to funding (Horizon2020, Wellcome Trust, BMGF...)
- Develop and validate surveillance – response systems

Beyond „One Health“: Towards Health in Social-Ecological Systems (SES)

Health of animals and humans are part of and determined by SES:



A diagnostic approach for going beyond panaceas in natural resource management (Ostrom, PNAS 2007, Nobel Laureate in Economics 2009)

Mixed teams to integrate human and animal health





Thank you very much