

# Monitoring and surveillance of animal health today and future perspectives

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— *Norwegian Veterinary Institute*

# Monitoring – Surveillance

Monitoring	Surveillance
The systematic (continuous or repeated):	
<ul style="list-style-type: none"> <li>• measurement</li> </ul>	
<ul style="list-style-type: none"> <li>• collection</li> </ul>	
<ul style="list-style-type: none"> <li>• collation</li> </ul>	
<ul style="list-style-type: none"> <li>• analysis</li> </ul>	
<ul style="list-style-type: none"> <li>• interpretation</li> </ul>	
	<ul style="list-style-type: none"> <li>• timely dissemination</li> </ul>
<b>of animal-health data.</b>	
Not associated with a pre-defined risk-mitigation plan	Contribute to risk-mitigation actions

Hoinville LJ, et al, 2013: Proposed terms and concepts for describing and evaluating animal-health surveillance systems. *Prev Vet Med*, 112: 1-12.



# Why survey animal health?

- Maintain and improve animal health
    - Animal productivity
    - Animal welfare
    - Human health
  - Secure safe and fair trade of production animals and their products
- Surveillance is a necessary component



# Animal health surveillance aims

- Animal health
  - Detect infections
  - Describe animal health status
  - Improve animal health
  - Eradicate infections
- Trade
  - Secure export and import of healthy animals
  - Document animal health status
    - To prove freedom from infections
    - To defend restrictions on import



# Aim

	Health	Trade
■ Control		
● Eradicate	X	x
● Improve / Sustain	X	
■ Preparedness		
● Early detection	X	
■ Descriptive		
● Map	X	
● Document	x	X
■ Status	x	X
■ Freedom		X

**Aim is crucial for surveillance design**



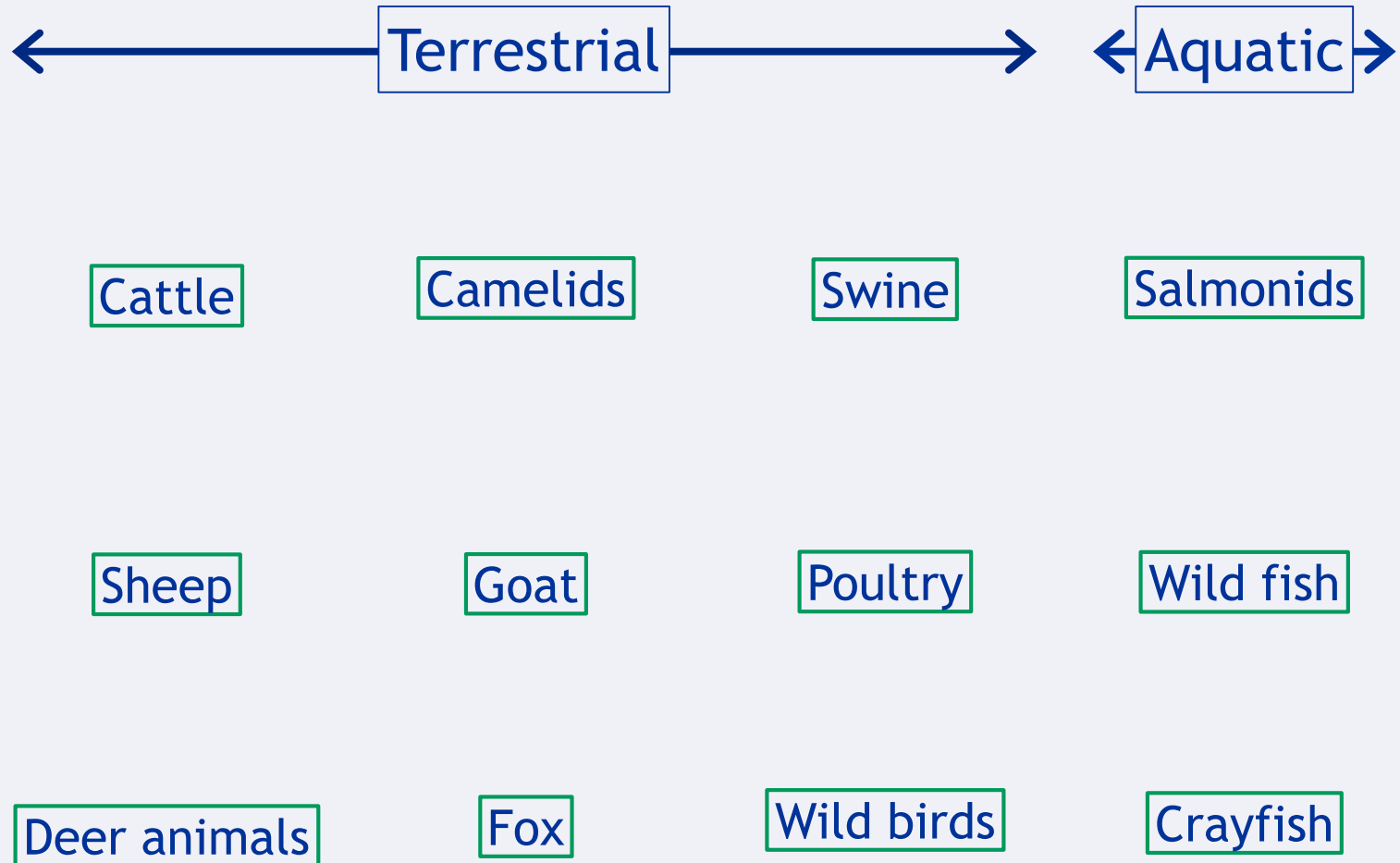
# Surveillance today

- Norway
- Infectious diseases
- Animals



# Surveillance programmes in Norway

## 12 animal species or species groups

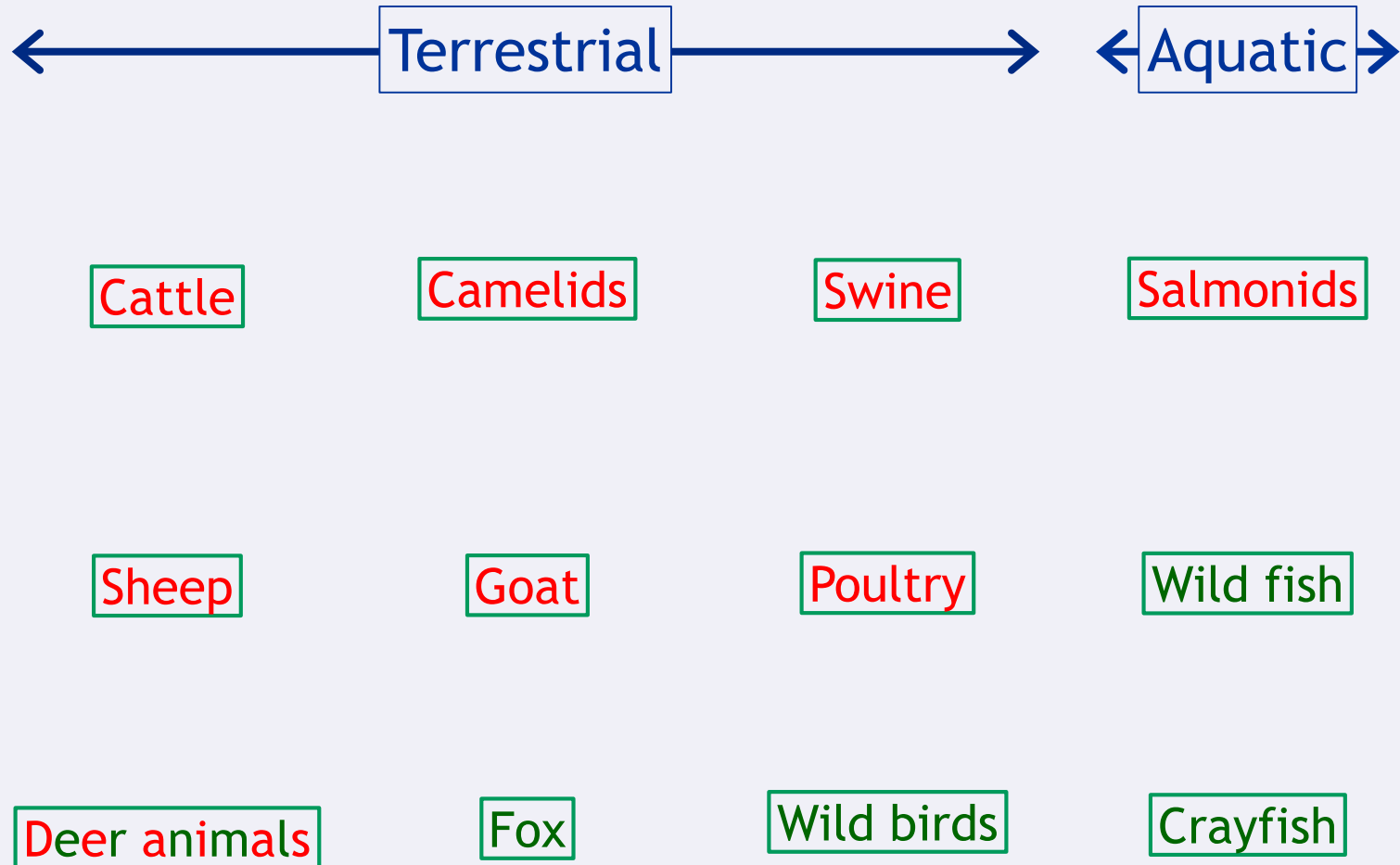


Photos: P. Hopp (cattle, sheep, mallard), H.M. Jordsmyr (swine, goat), D.A. Strand (crayfish), R. Svensen (salmon), Coulorbox.com (reindeer, fox, alpaca, poultry, trout).



# Surveillance programmes in Norway

## Production animals and wild animals



Photos: P. Hopp (cattle, sheep, mallard), H.M. Jordsmyr (swine, goat), D.A. Strand (crayfish), R. Svensen (salmon), Coulorbox.com (reindeer, fox, alpaca, poultry, trout).





# Surveillance programmes in Norway

> 30 infectious agents

*B. abortus*  
EBL IBR *Salmonella*  
ParaTub. Tub. BSE BT  
BVD BRSV BoCv

Cattle

ParaTub.  
*B. melitensis* CAE

Goat

*Salmonella* SI  
PRRS TGE PED  
M. hyopneumonia AD

Swine

Scrapie  
Maedi ParaTub.  
*B. melitensis* Footrot

Sheep

ParaTub. Tub.  
*Psoroptes ovis*

Camelids

ILT *Salmonella* ND  
*Mycoplasma* AI  
Campylobacter ART

Poultry

CWD Tub.

Deer animals

*E. multilocularis*

Fox

AI

Wild birds

Salmon lice  
VHS ILA PD  
IHN *G. salaris* BKD  
Resistant Salmon lice

Salmonids

*G. salaris*  
Diseases

Wild fish

*Aphanomyces astaci*

Crayfish



# Surveillance programmes in Norway

		Health	Trade
■ Control			
● Eradicate	7	X	x
● Improve / Sustain	19	X	
■ Preparedness			
● Early detection	6	X	
■ Descriptive			
● Map	2	X	
● Document		x	X
■ Status	3	x	X
■ Freedom	20		X



# Surveillance programmes in Norway

## Summary

- Document freedom from infection
  - EU legislation / national legislation
  - Government
- Infections at a low level
  - Keep at low level
  - Government
- Eradication
  - Infection with potentially large consequences
  - Industry and government
- Early detection
  - Relies mostly on notifying of diseases

Tub.    EBL    BVD  
           *B. abortus*    AD  
                           PED  
                           *E. multilocularis*

ParaTub.    *Salmonella*    Scrapie  
                   *Aphanomyces astaci*    Maedi

                                  BRSV    CAE  
   BoCv

  Footrot    *G. salaris*

Expensive and want to do more



# Challenges

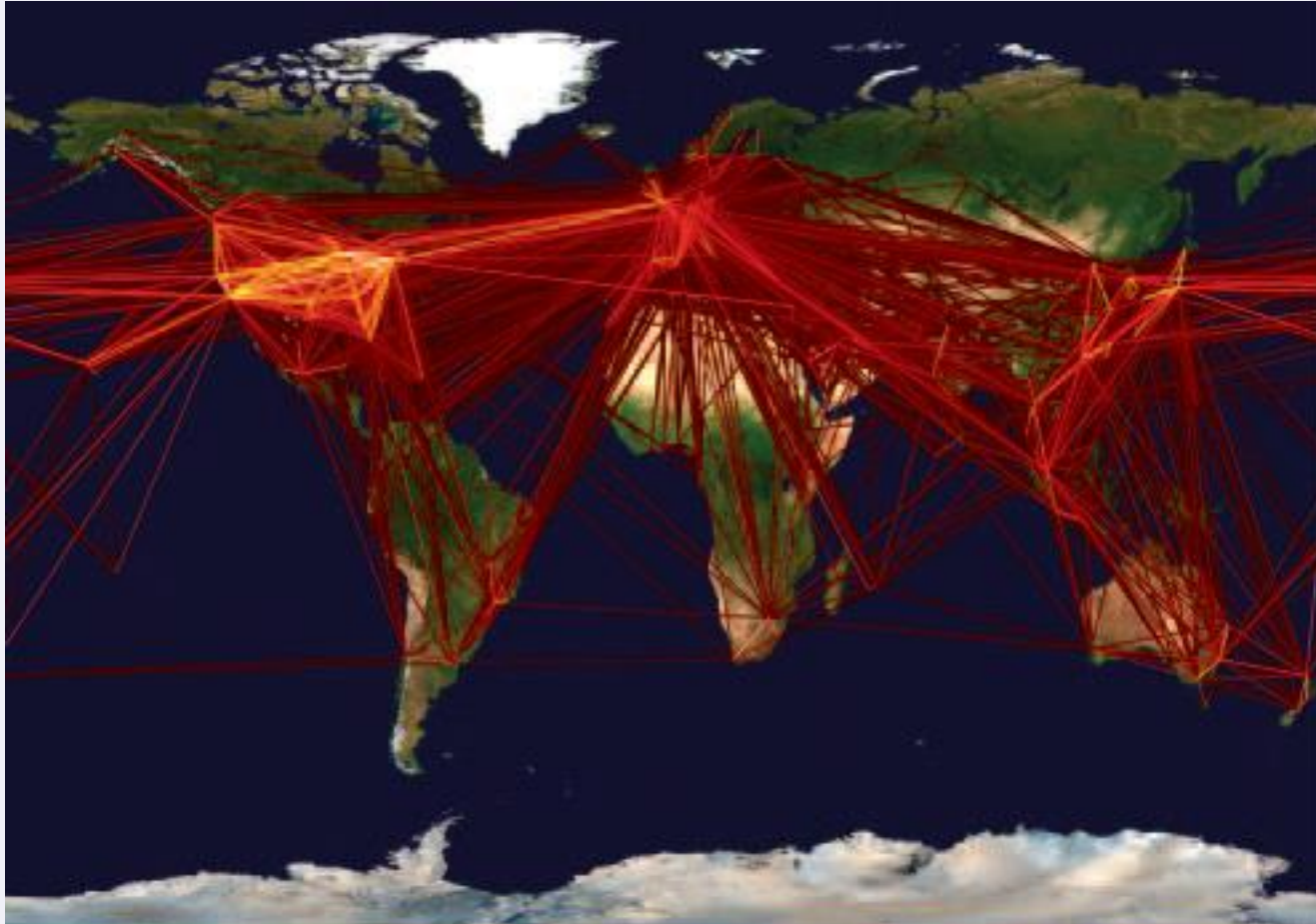
- One world
  - Increased globalisation
  - Climate change
- One health
- Economy



Colourbox.com



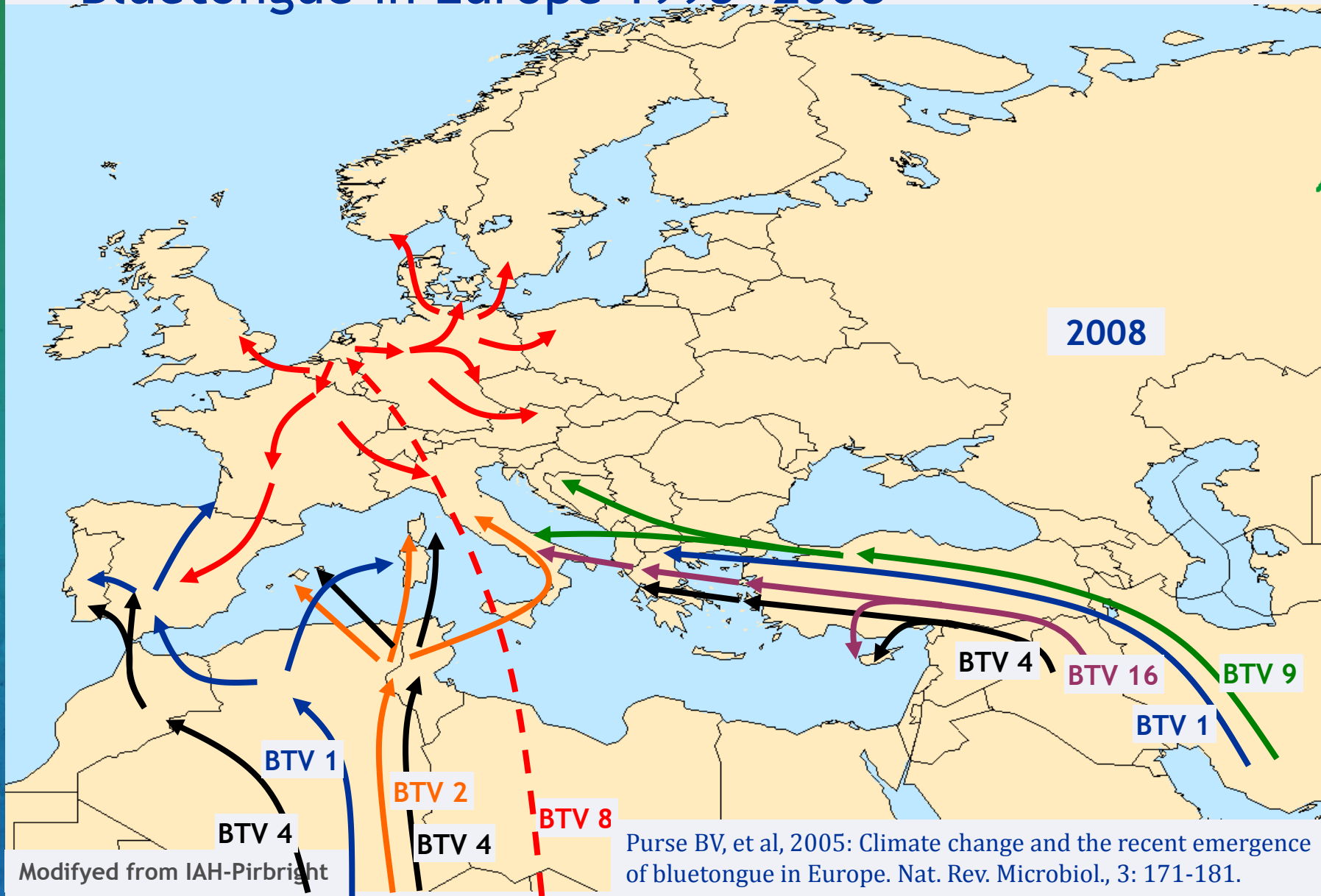
# Increased globalisation



## Global aviation network

Hufnagel L, et al, 2004: Forecast and control of epidemics in a globalized world. PNAS, 101: 15124-15129.

# Climatic change Bluetongue in Europe 1998 -2008

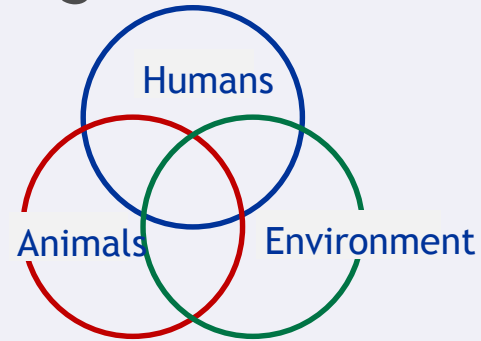


Modified from IAH-Pirbright

Purse BV, et al, 2005: Climate change and the recent emergence of bluetongue in Europe. *Nat. Rev. Microbiol.*, 3: 171-181.

# Challenges

- One world
  - Increased globalisation
  - Climate change
  - ➔ Emergence and re-emergence of diseases
- One health
- Economy



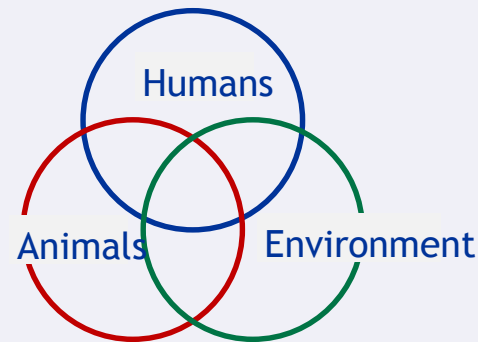


# One health

Health of

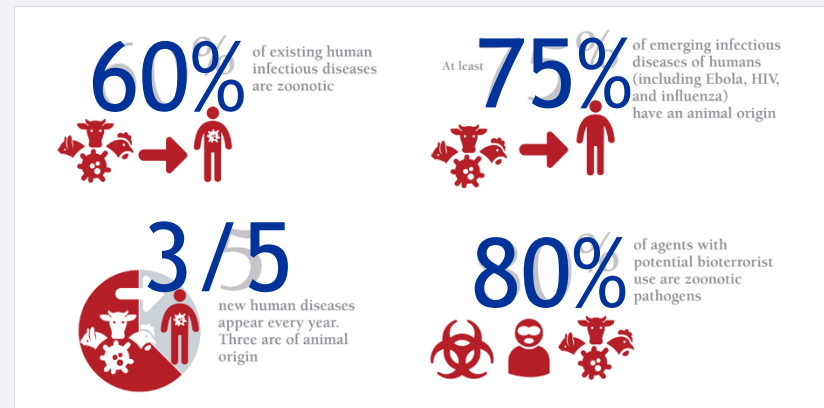
- humans
- animals
- ecosystems

are interconnected



Controlling zoonoses at the animal source is

- Effective
- Economic



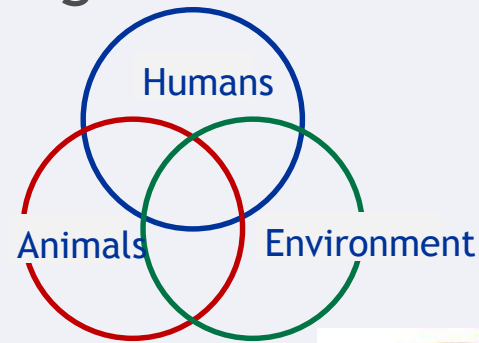
OIE World Organisation for Animal Health





# Challenges

- One world
  - Increased globalisation
  - Climate change
  - ➔ Emergence and re-emergence of diseases
- One health
  - ➔ Control zoonoses at the animal source
- Economy
  - Good value for the money



Colourbox.com



# Good value for the money

## Need to argue for surveillance

- Diseases can give substantial economic loss
  - Production loss
  - Human health
  - Less trade
- Surveillance and control may reduce the loss
- Cost - benefit analysis
  
- More surveillance for less money
  - Improve design and analysis
- Cost - efficient analysis



# Economic evaluation of surveillance

## Cost - benefit

- Societal cost and benefits
  - With surveillance
  - Without surveillance
- ➔ No surveillance is an option

## Cost - efficiency

- Surveillance costs
  - Alternative surveillance strategies
- ➔ Surveillance will be performed



# More surveillance for less money I

## Risk based sampling

- Higher probability of having disease
  - Each sample higher value
  - Sample size may be reduced
- 
- If costs per sample equal
- money saved



Providing a **new generation** of methodologies and tools  
for cost-effective **risk-based** animal health **surveillance** systems  
for the benefit of livestock producers, decision makers and consumers



# RiskSur (EU FP7, 2012-2015)



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## RISK-BASED ANIMAL HEALTH SURVEILLANCE SYSTEMS

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### RISKSUR webtools

RISKSUR tools for surveillance design and evaluation

**Webtools**

- Design
- Evaluation

### RISKSUR online training

RISKSUR is offering online training material in the form of recorded presentations and webinars

**Best practices**

### RISKSUR best practices

The RISKSUR consortium has finalised and published a comprehensive document on best practices in animal health surveillance

<http://www.fp7-risksur.eu/>

# More surveillance for less money II

## Syndromic surveillance

- Surveillance of health-related events
  - Early detection
  - Emerging diseases



Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: [www.elsevier.com/locate/prevetmed](http://www.elsevier.com/locate/prevetmed)



Review

Veterinary syndromi  
for development

Fernanda C. Dórea<sup>a</sup>, Javier



Contents lists available at SciVerse ScienceDirect

Preventive Veterinary Medicine

journal homepage: [www.elsevier.com/locate/prevetmed](http://www.elsevier.com/locate/prevetmed)



Retrospective time series analysis of veterinary laboratory data:  
Preparing a historical baseline for cluster detection in syndromic  
surveillance

Fernanda C. Dórea<sup>a</sup>,  
Kelton<sup>d</sup>, Javier Sanc

JOURNAL  
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[rsif.royalsocietypublishing.org](http://rsif.royalsocietypublishing.org)

Syndromic surveillance using veterinary  
laboratory data: data pre-processing and  
algorithm performance evaluation

Fernanda C. Dórea<sup>1</sup>, Beverly J. McEwen<sup>2</sup>, W. Bruce McNab<sup>3</sup>,  
Crawford W. Revie<sup>1</sup> and Javier Sanchez<sup>1</sup>







# Summary

- Numerous surveillance activities
  - Species
  - Infectious agents
  
- Increasing demand for surveillance
  - Emergence and re-emergence of diseases
    - Globalisation
    - Climate change
  - One health
    - Control zoonoses at the animal source





# Summary

- New methods
  - Risk based surveillance
  - Syndromic surveillance
  - New data sources
  
- Evaluation
  - Optimise design according to aim
  - Economy
    - Cost - efficiency
    - Cost - benefit



**Thank you for your attention!**