Better Training for Safer Food
BTSF

Programme Animal Health Prevention and Control of Emerging Animal Diseases

The *One Health* concept

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One health

http://www.izs.it/vet_italiana/2009/45_1/45_1.htm

http://www.onehealthinitiative.com

Agenda

- *Definition of* One Health
- *Global Early Warning System (GLEWS)*
- *Development of the knowledge of the human-animal-environment interface*
  - **Hepatitis E virus infection as an example**
  - **West Nile fever as an example**

http://www.glews.net/

Formal definition of *One Health*

- *Vision statement*
  - **One Health is dedicated to improving the lives of all species – human and animal – through the integration of human medicine and veterinary medicine**

- *Mission statement*
  - **Recognizing that human and animal health and mental health (via the human-animal bond phenomenon) are inextricably linked.**

Gibbs and Anderson, Vet. Ital., 2009, 45, 35

One Health shall be achieved through

- *Joint educational efforts between human and veterinary medicine schools*
- *Joint communication efforts*
- *Joint efforts in clinical care regarding cross-species disease transmission*
- *Joint cross-species disease surveillance*

One Health shall be achieved through

- *Joint efforts in better understanding of cross-species disease transmission*
- *Joint efforts in the development of diagnostics, medicines and vaccines for the control of diseases across species*
- *Joint efforts to inform and educate political leaders and public sector*

Further expectations from *One Health*

- *Healthy plants*
  - **Plant: direct or indirect food sources**
  - **Need for plant protection**
  - **Access to healthy plants to maintain healthy humans and healthy animals**
- *One toxicology*
  - **Control of direct and indirect toxicant-induced injury to human beings, other animals, and other components of biodiversity**
- *One Health research and application tool box*
  - **Practical methodology for integrating disease surveillance, joint animal/human epidemiological studies, health service developments**

Kaplan et al., Vet. Ital., 2009, 45, 9

Global Early Warning System (GLEWS) for major animal diseases including zoonoses

joint initiative

http://www.glews.net/

GLEWS: joint FAO, OIE, WHO initiative

- *To bring together human and veterinary public health systems*
- *To share zoonotic disease outbreak information*
- *To share epidemiological and risk analysis*
- *To deliver early warning messages to the international community on areas at risk*


Disease Tracking Systems
FAO EMPRES-i Global Animal Disease Information System
WHO Global Health Atlas
OIE WAHID World Animal Health Information Database
Additional data
Other FAO and UN data
Refugees movements
Climatic data
Production, Economic data
Wildlife and other migration
Analysis
GLEWS
Early Warning
Disease alerts
Trends and analysis
Forecasting
Risk assessment
Response
Preparedness plan updates
Rapid intervention
Coordinated response
Risk mitigation guidelines
Rehabilitation
oie
World Health Organization

priority diseases/pathogens

African Swine Fever
Anthrax *
Bovine Spongiform Encephalopathy *
Brucellosis *
Classical Swine Fever
Contagious Bovine Pleuropneumonia
Crimean Congo Hemorrhagic Fever *
Ebola Virus *
Food borne diseases *
Foot and Mouth Disease
Highly Pathogenic Avian Influenza *
Japanese Encephalitis *
Marburg Hemorrhagic Fever *

New World Screwworm
Nipah Virus *
Old World Screwworm
Peste des Petits Ruminants
Q Fever *
Rabies *
Rift Valley Fever *
Rinderpest – Stomatitis/EnteritisSheep
Pox/Goat Pox
Tularemia *
Venezuelan Equine Encephalomyelitis *
West Nile Virus *

Development of the knowledge of the human-animal-environment interface

- *Prevention and management of zoonotic aspects of emerging diseases*
  - **Example: hepatitis E virus infection**

    Infection of human and animals (pigs, wildboar, deer)

    Epidemiological pattern varying depending on the development of the country

    Emerging infection in industrialised countries
- *Early detection and response to new disease appearance*
  - **Example: West Nile fever surveillance**

    Horses and humans as sentinels; infection detected in birds and mosquitoes
  - **Example: Crimean Congo hemorrhagic fever**

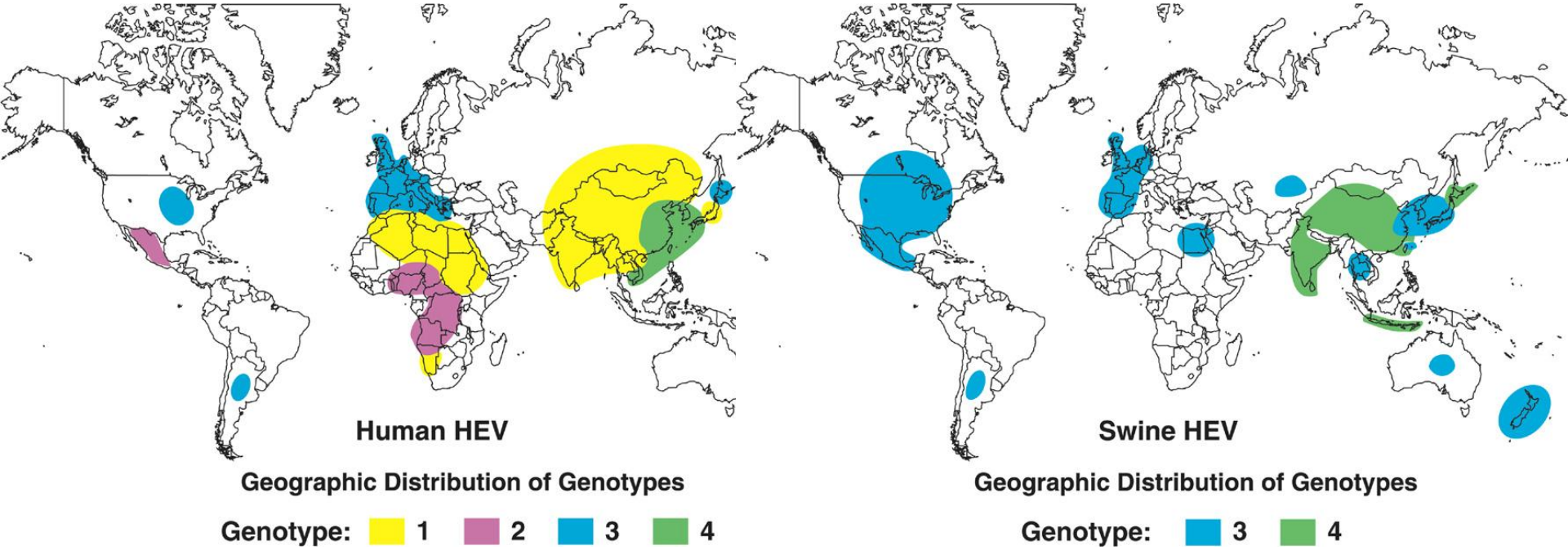
    Ruminants as sentinel animals

Hepatitis E virus (HEV) infection in humans and animals – zoonotic aspects

Hepeviridae
Hepevirus

Genotype (72-77% of nucleotide homology)	**Subtypes** (85-90% of nucleotide homology)	**Host**
HEV 1	a, b, c, d, e	Human (1case in 2006 in a swine in Cambodia)
HEV 2	a, b	Human
HEV 3 (+ rabbit HEV: 82% of homology with HEV3)	a, b, c, d, e, f, g, h, i, j	Human+ swine, wild boar, deer, mongoose
HEV 4	a, b, c, d, e, f, g	Human+ swine, wild boar, deer, mongoose
Avian HEV « (HEV 5) » Not an ICTV group		Chicken

HEPATITIS E IN THE WORLD



Purcell et al, 2008

HEPATITIS E IN THE WORLD

Genotypes	1 & 2	3 & 4
Host	Human	Human + swine, wild boar, deer, mongoose
Developed countries	+/- (importation)	+++
Developing countries	+++	+
Transmission	Contaminated water	Suspicion zoonosis ?

HEPATITIS E IN EUROPE

Species	Country	Seroprevalence	HEV RNA genotype 3 (prevalence)	Sample
Swine	World	30-80	Nd	Serum
Wild boar	Hungary	nd	12.2% (9/74)	Liver
	Germany	29.9%	5.3%	Serum
		nd	15%	Liver
	Italy	nd	25% (22/88)	Bile
	Spain	42.7%	19.6%	Serum
	The Netherlands	nd	4%	Feces
		12%	nd	Serum
	France	nd	2.5% (7/285)	Liver

Putative transmission routes

Contact animal – human	Foodborne	
-Pig breeders -Veterinarians -Hunters -Slaughterhouse staff → **Sero prevalence**	**Confirmed**	**Suspected**
	2 cases in Japan	Raw *figatelli* in south of France

Controversy in the south of France

Colson *et al* showed that genotype 3 was present in 7 *figatelli* on 12 ➔ true risk of contamination

IgM and/or RNA :

- **7 of 13 individuals who ate raw *figatellu***
- **0 of 5 individuals who did not eat raw *figatellu*.**

Colson et al, 2010

Is HEV a zoonotic virus?

Nb of human cases	Incubation period	Species	Food	Genotype	Elements for a zoonotic transmission	Reference Country
4	40 days	**Sika Deer**	Slices of raw meat	**3**	**100% of homology** between patient sequences and frozen meat sequences	Tei et al, 2003 Japan
1	60 days	**Wild boar**	Stew	**3**	**100% of homology** between patient sequences and frozen meat sequences	Li et al, 2005 Japan

HEV
at the human-animal-food interface

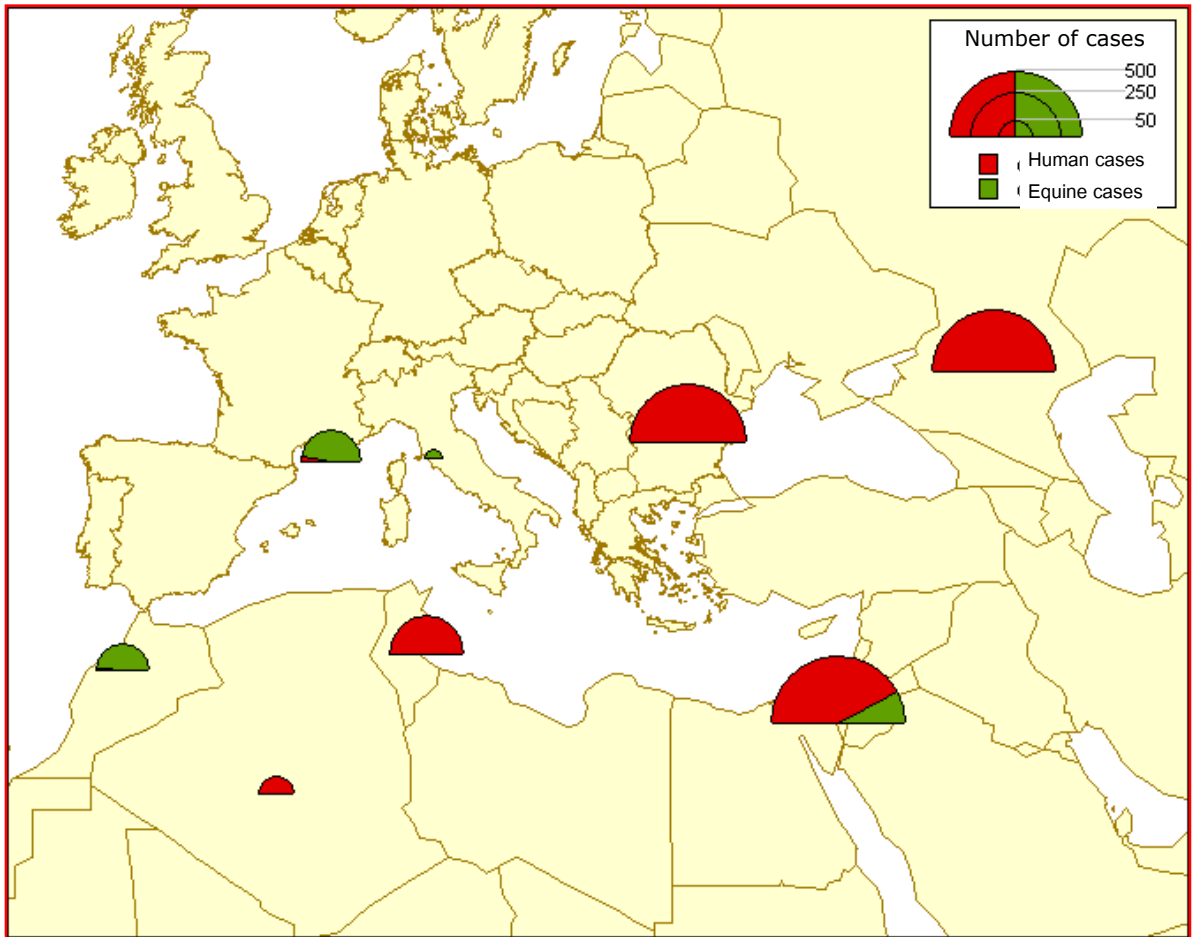
- *Human to human transmission*
- *Animal to animal contamination*
- *Putative animal to human transmission*
- *Through food contamination*
- *Viral genotype variability*
- *Integrated research*
  - **For example: Belgian program HEVEA**

    Faculty of veterinary medicine (veterinary virology)
    Scientific Institute for Public Health (virology)

West Nile Fever in humans and horses – zoonotic aspects

Flaviviridae
Flavivirus

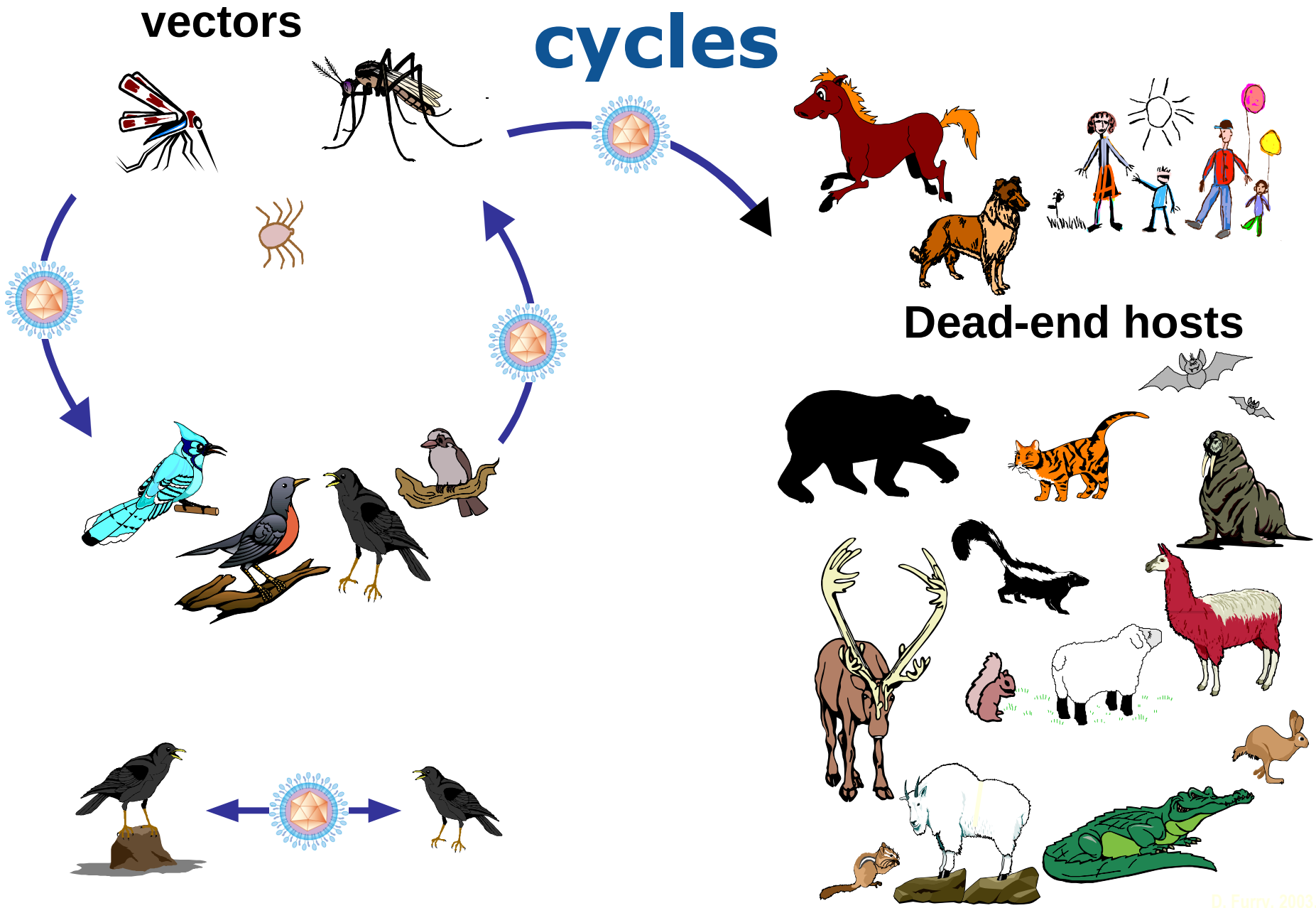
WNF outbreaks in Europe and Mediterranean area since 1994



Dauphin et al.,
Virologie, 2006

Country	Year	Human cases	Human deaths	Equine cases	Equine deaths
Czek Rep	1997	2	0		
France	2000			76	21
	2003	7	0	4	1
	2004			32	7
	2006			5	1
Italy	1998			14	8
	2008	3	0	68	ND
Spain	2004	1	0		
Portugal	2004	2	ND		
Hungary	2003	14	0		
	2008	12	0	10	2
Roumania	1996	393	17		
	1997	15	0		
	1998	5	0		
	1999	7	0		
	2000	13	0		
	2008	2	0		
Russia	1999	826	40		
	2000	56	ND		
	2001	64	ND		
	2004	3	0		
	2005	90	3		
	2006	6	0		
	2007	54	2		

WNF virus epidemiological cycles



WNF surveillance: an integrated approach

- *Syndromic approach*
  - **Encephalitis in horses**
  - **Febrile illness – meningo-encephalitis in humans**
  - **Abnormal mortalities in birds (326 susceptible species, crows and robins, especially e.g.)**
- *Active surveillance*
  - **Antibodies in birds**
  - **Virus in *Culex***
  - **Difficult approaches because low prevalence, low and transient incidence**

Crimean-Congo Hemorrhagic fever in humans – ruminants as reservoirs

Bunyaviridae
Nairovirus

CCHF virus infection in animals

- *After a bite by an infected tick*
- *Subclinical infection*
- *Mild undetected hyperthermia*
- *The viraemia last 1 week*

CCHF diagnostic

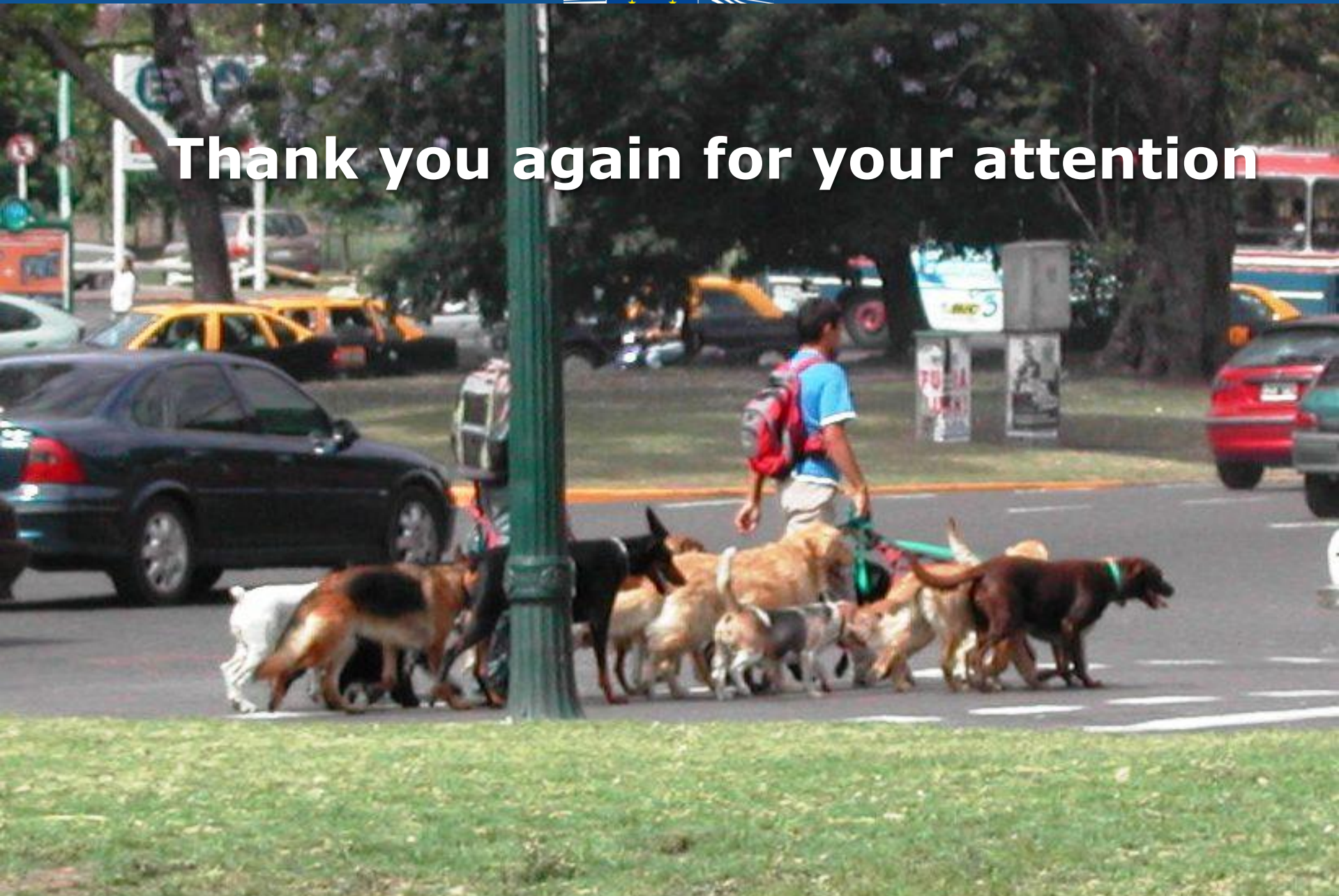
- *In animals (ruminants)*
  - **Subclinical infection**
  - **Serological testing**
- *In human beings*
  - **Detection of IgM by ELISA**
  - **RT PCR: detection of viraemia**

CCHF surveillance: an integrated approach

- *Syndromic approach*
  - **Human clinical cases (hemorrhagic fever)**
- *Active surveillance*
  - **Antibodies in ruminants (sheep)**
  - **Virus (RNA) in (mainly) *hyalomma* ticks**
  - **Difficult approaches because low prevalence, low and transient incidence**

One Health

- *Addressing health risks at the animal-human-ecosystems interfaces*
- *Without forgetting the general objective of improving human and animal health, including plant health*
- *The following lecture will address complementary aspects*


Thank you again for your attention