Better Training for Safer Food
BTSF

Management of emerging animal disease outbreak.

Vittorio Guberti DVM

First high risk period

- The period between the introduction of an infection into a Country and the first detection of the infection
- The length of the HRP1 depends on the efficacy and efficiency of the surveillance scheme in place
- Surveillance strategy tailored on specific disease(s)

Second high risk period

- The period between the first animal has been detected as INFECTED and the establishment of measures to prevent virus spreading: OUTBREAK MANAGEMENT

1st HRP from where does the infection come? The example from The Netherlands

- Movement of Infected animals: 37% of new cases
- Infected Lorries for the 15% of new cases
- Persons: 6%
- Neighborhood: 32%
- Unknown: 10%

2nd HRP: From where does the infection come from?

- Infected animals 2%
- Lorries: 11%
- Persons: 15%
- Pick up service rendering: 13%
- Contaminated semen: 8%
- Slurry: 1%
- Neighborhood: 39%
- Unknown: 11%

Disease control measures in case of an emerging disease outbreak:

- The basic principles of a control programme and the measures to address them under overall responsibility of Veterinary Authority are:

A) Identification of foci of infection:

- Early detection and diagnosis
  - Animal owners, practictionnairs
  - Public Veterinary Services
- Disease reporting
- Surveys
- Abattoir surveillance (where abattoirs exist)
- Epidemiological and outbreak investigation

CSF in the Nederland was detected thanks to…..

Farmers = 31.9%

Practitioners = 24.5%

Tracing team = 10.3%

Screening team = 8.4

During preventive slaughter = 6.15

Active surveillance in surveillance area = 3.9%

Active surveillance in farms where infected semen has been used = 4%

Routine post mortem examination = 0.7%

B) Prevention of infection of susceptible hosts:

- OUTBREAK PREVENTION
- Quarantine of new introduced individuals
- Animal movement control
- Vector control
- Public awareness and communication
- Vaccination

C) Elimination of the infectious agent:

- Stamping-out of infected and in contact animals
- Cleaning, disinfection and rest period
- Treatment of products and by-products
- Test and isolation (?)
- Test and slaughter
- Vaccination

Not all the Regions have the same legislation, habits etc.

The framework

- Official “suspect case” definition
- Suspect case detected through surveillance
- Standstill of the suspected farms
- Suspected case confirmation through appropriate laboratory investigations
- Outbreack management

Suspect case definition: a CSF example

Any individual or cluster of swine that show:

1. CLINICAL SIGNS: high fever (>41.5° C)
nervous disorders
high lethality rate (> 30% affecting all age classes)
sudden death without any prior clinical signs; and

2. PATHOLOGY: Hemorrhagic lymph nodes
Enlarged and congested spleen; and

3. FARM HISTORY: a history of recent pig introduction to the holding or the practice of swill feeding or allowing scavenging to rubbish dumps.

4. CONFIRMED CASE – Laboratory:

CSF virus detected, or antibodies in NOT vaccinated animals (any test) with epidemiological evidence of clinical disease; or

CSF CONFIRMATION - Virus or genetic component detection at laboratory level

Available measures in the framework of emerging disease outbreak management:

1: Biosecurity measures;

2: Administrative measures;

3: Depopulation and disposal of infected herds;

4: Cleaning and disinfection of premises;

5: Epidemiological investigation;

6: Emergency vaccination;

7: Laboratory diagnosis (new non accredited/validated tests)

Any measure should be:

- Scientifically based
- Relevant
- Necessary
- Proportionate to the risks
- Proportionate to the impact
- Acceptable
- Affordable
- Sustainable
- Cost-effective

Application of disease control measures should follow standard operating procedures:

- Implementation, maintenance, monitoring of the measures
- Application of corrective actions
- Verification of the processes
- Record keeping
- Assessment effectiveness interventions

EU Tools for Animal Disease Control

- Harmonised standards (legislation) at EU level
- Regionalisation/zoning
- Contingency plans, EU Veterinary Emergency Team
- Surveillance
- Diagnostic tools
- Traceability: Identification & registration of animals

EU Tools for Animal Disease Control

- Vaccines: EU vaccine banks
- EU Reference laboratories network
- Eradication programmes
- Scientific progress (research, EFSA)
- Financial instrument: veterinary fund

“Prevention is better than cure”

Biosecurity plan according OIE: “A plan that identifies potential pathways for the introduction and spread of disease in a zone or compartment, and describes the measures which will be applied to mitigate the disease risks, if applicable, in accordance with the Terrestrial Code” (OIE, 2008b)

Routes of disease transmission and implications for biosecurity:

- Direct animal-animal contact
- People like transporters,vets and technicians
- Vehicles and other fomites like rendering and slaughterhouse pickup transport
- Semen
- Medicine/treatments

Routes of disease transmission and implications for biosecurity:

- Airborne transmission
- Animal feed and drinking water
- Animal manure, urine, slurry and bedding
- Birds, bats, rodents, wildlife and stray/domestic animals
- Arthropods like ticks and mosquitoes

Basic principles of biosecurity classified in 3 steps after identification of potential risks (HACCP):

1: Segregation

2: Cleaning

3: Disinfection

Segregation:

- Creation of barriers and the control of what passes through them.”If a pathogen does not enter a holding, no infection can take place”.

- Only essential people have access and to the farm and animals follow guidelines like changing of clothing and footwear and handwashing or showering.

Segregation measures (1):

- Strict control of entrance/exit
- Full fencing around and closed entrance to farm area
- Ensure long distances between farms
- Install nets against birds
- Quarantine for newly purchased animals
- Limit the number of sources of replacement stocks
- Use Artificial Insemination instead of moving breeding animals
- Shower with change of clothing and footwear

Segregation measures (2):

- Exclusion of wildlife and rodents
- Create loading bay at farm
- Ban the keeping of same farm animals at workers homes
- Keep animal species separate
- Parasite control (including ticks)
- Herd management all-in all-out system
- Fallow period between batches
- Manure management (composting,spreading)

Cleaning and disinfection:

- Decontamination of vehicles , premises and other objects with high pressure water and soap

- After effective and comprehensive cleaning follows consistently and correctly disinfection with approved disinfection agents

- Disinfection is according OIE: "intended to destroy the infectious or parasitic agents of animal diseases, including zoonoses.

Emergency vaccination:

- Aim: to limit/halt the spread of the infection (reproduction ratio < 1)
- should be **faster** than the spread of the infection;
- Vaccinate-to-kill will be progressively replaced by vaccinate-to-live
- In combination with effective diagnostic tools that recognise vaccinated from infected individuals
- vaccines/antigens bank including legal basis

Emergency vaccination:

- Vaccination is only a tool (biosecurity measures)
- clinical protection can be counteractive (decresing in efficency of passive surveillance) and virological protection at least no virus shed

Problem: Emerging diseases unpredictable and unknown

Conditions for emergency vaccination:

- Area high density and vulnerable animals
- Multifocal introduction and/or multifocal spread
- High risk of uncontrollable spread of infection like airborne infections
- Non vaccination measures (stamping out) notaccepted
- High risk zoonotic agent spreading from animals to humans or vice versa
- Postvaccination screening program essential to find possible carrier animals > culling

Use of antiviral therapy and prophylaxis:

To **close gaps** in current control measures like

- Period before vaccine elicits immunity respons ("immunity gap")
- Difference in immune response according to subtypes or Serotypes involved and in vaccines
- Animal welfare
- Maternal antibodies that can block vaccine antigen(s)
- Public opposition to mass pre-emptive culling

Antiviral therapy and prophylaxis

- *Non-specific/specific antivirus agents*
- *Main aim to bridge "immunity-gap" and **reduce viral replication, excretion and transmission***
- *Controlled field trials needed for acceptance by the competent authorities an public*
- *Costs*
- *Unknown competition with virus, selection of new strains etc.*
- *No studies/experience about the realthionship between antiviral and virus population dynamic*

Response to a highly contagious disease (HCD)

Control and elimination of HCD/FAD relies on three basic principles which make up the operational components of a response:

1. **Preventing contact between susceptible animals and HCD agents** (Quarantine, movement control and surveillance)

2. **Stopping the production of the agent by infected or exposed animals** (Stamping-out and disposal of infected or exposed animals)

3. **Increasing the disease resistance of susceptible animals** (Strategic vaccination)

Strategy for control & eradication of HCD/TAD

1. **Availability of a response system that quickly detects a HCD/TAD and prevents its spread beyond the index premises** (Early detection, Contingency plan and Operational Manual with SOPs)

2. **Eradication operations** (Treatment of affected premises fairly and efficiently)

3. **(Vaccination)**

Operational components

1. Quarantine and movement control
2. Epidemiology
3. Tracing
4. Surveillance
5. Valuation
6. Culling
7. Disposal
8. Cleaning and disinfection
9. Disposition of animal product
10. Biosecurity
11. Risk assessment
12. Wildlife management
13. Vector control
14. Country/regional zoning

When the presence of HCD/TAD in a holding is suspected

When a premise is classified as being “highly likely” to have TAD, appropriate local **response measures** will immediately be implemented to mitigate the crisis and minimize consequences of the outbreak in accordance with the procedures laid down in the **National Contingency Plan (Action Plans)**

ALERT THE EMERGENCY MANAGMENT UNITS

When the presence of HCD/TAD in a holding is suspected

- Holding placed under **official surveillance** (stand still)
- **Counting** of all animals in the various categories (sick, dead or likely to be infected)
- **Movement restriction** of pigs, pig carcasses, meat and pig products, persons, vehicles
- Means of **disinfection** at the entrances and exit of holdings
- **Epidemiological inquiry**
  - Time of the existing of the virus on the holding
  - Origin of the infection
  - Movement of persons, vehicles pigs and products
  - Role played by other reservoir species

Confirmed outbreak

POSITIVE LABORATORY RESULTS

1. Settling of the different levels of the **crisis units** (Local, Regional and Central)
2. The outbreak must be **notified** to the competent authorities

- All animals on the infected holding and on dangerous contact holdings must be **slaughtered as quickly as possible** avoiding the spreading of the infection
- The carcasses of dead or killed animals are to be processed under the official supervision

Confirmed outbreak

POSITIVE LABORATORY RESULTS

5) Meat and product traced and processed
6) Waste and feeding stuffs are to be processed
7) **Building** used for housing the animals, vehicles used for transport and the equipment are to be **cleaned and disinfected**
8) Manure and bedding must be stacked to heat, sprayed with disinfectant and left for a number of days (according to the infection) or destroyed by burning or burying;
9) **Slurry** must be stored for a number of days according to the infection after the last addition of infective material

Alternative disposal procedures

- Burning requires considerable skill to achieve effective results; in most cases the carcasses are not properly incinerated
  - Large amount of fuel or combustible materials are needed
  - Entail the danger of starting grass or bush fires
  - Law restriction

- Composting

- Rendering


15.01.2011


15.01.2011


15.01.2011

15.01.2011

15.01.2011

Decontamination

The choice of the disinfectants, insecticides and the procedures for disinfection must be made taking into account the nature of premises, vehicles and the objects which are to be treated

PRELIMINARY CLEANSING AND DISINFECTION

1) Washing and cleansing of the ground, floor, ramps, yards and walls of holdings in which pigs were housed or slaughtered;
2) Carcasses of killed animals must be sprayed with disinfectants;
3) If the carcasses are removed for processing the (covered) container must be disinfected;
4) The disinfectant must remain on the surface for at least 24 hours

Decontamination

The choice of the disinfectants, insecticides and the procedures for disinfection must be made taking into account the nature of premises, vehicles and the objects which are to be treated

FINAL CLEANSING AND DISINFECTION

6) Grease and dirt must be removed from surfaces with degreasing agent and the surfaces washed with water;

7) After washing further spraying with disinfectant must be applied;

8) After seven days the procedure must be repeated;

Disinfectants against CSF virus

- Sodium Hydroxide 2% (Carcasses, stables, liquid manure)
- Sodium Carbonate 40% (pH 11,6) in warm water 95°C (Stables, floors, walls)
- Orthophenilphenol 1%
- Formalin 6-10%
- Iodine and its by-products
- Virkon S 1%

European Commission

Establishment of control areas/zones

- A control area, consisting of infected/protection zone (IZ) and surveillance/buffer (SZ) zone, will be established around the outbreak site to ensure the rapid and effective containment of the disease
- The size/radius (±10 Km) of this zones are logistically and epidemiologically designed and can be expanded or reduced as tracing and surveillance results became available
- Specific measures are applied in IZ and SZ

Measures applied in infected and surveillance zones

1. Census of all the holdings which will be visited by VS for clinical examination
2. The movement and transport of susceptible animals is prohibited
3. All dead or diseased animals on a holding shall be notified to VS in order to be tested
4. Persons entering or leaving the holding shall comply with appropriate hygiene measures to reduce the risk of infection spreading

Measures applied in infected and surveillance zones

5) Conducting a public awareness campaign to increase compliance with movement restriction

6) In exceptional circumstances the competent authority may authorize the removal of individuals the holdings included in IZ and SZ

Measures applied in infected and surveillance zones

The restriction measures (EU legislation) can be removed when:

1. Cleaning, disinfection in infected holding have been carried out (both **IZ** and **SZ**)

2. Animals in all holdings have undergone to a negative clinical and laboratory examinations (**IZ**)

The examinations referred to point 2 cannot take place until 45 (**IZ**) or 40 (**SZ**) days have elapsed since the completion of preliminary cleansing, disinfection, use of sentinel animals foresees for some infections.

Repopulation following disease outbeak

The reintroduction of pigs to holding shall not take place until at least **40 days** after completion of cleansing, disinfection and desensitization operations (EU legislation)

The procedure is based on the type of farming practiced on the holding concerned and on the presence or not of the vectors.

- **Open-air holdings**: sentinel animals are often requested before repopulation; they are tested at certain number of days according to the disease

- **Other forms of rearing**: all the animals can be introduced (within 20 days) and 45 days after the arrival will be tested for the infection

AIV example through LPAI H5 H7 and HPAI

- Active surveillance to detect LPAI H5 and H7 subtypes: passive surveillance does not work
- AIV LPAI at risk Farms: back yard, multispecies, surface water, contact with waterfowl
- Serology works better than virology

AIV example through LPAI H5 H7 and HPAI

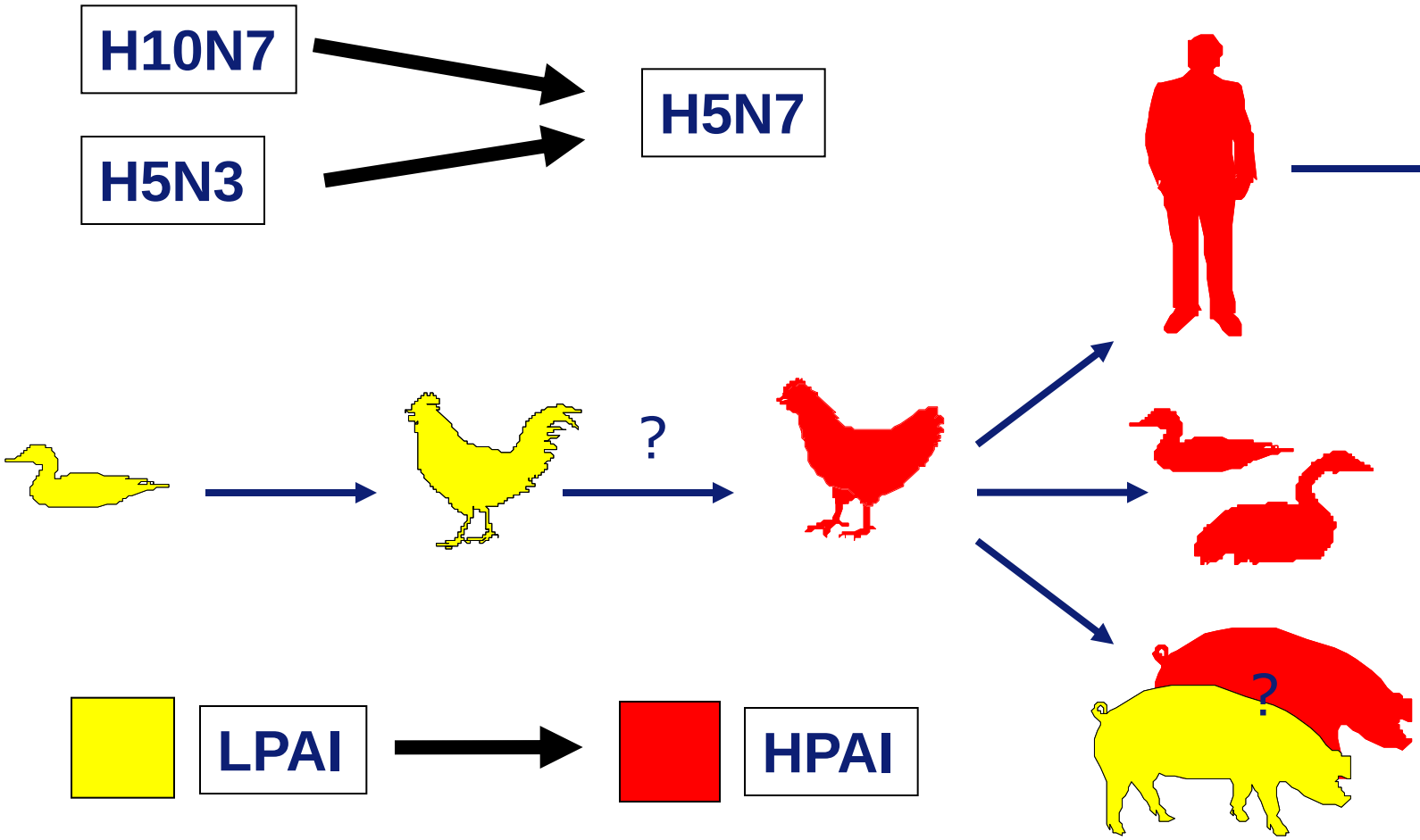
- Virus detection and identification is compulsory the measures in place
- Surveillance zone 10 Km
- Protection zone 3 Km Culling of the infected holding
- Tracing
- Epidemiologic inquiry
- Screening

Public health issues: zoonotic importance & pandemic

To prevent mutation into a variant which might endanger humans, H7/H5 should not come in contact with human influenza viruses:

- Protective clothing, masks and goggles
- Vaccination against human influenza
- Surveillance on people active in culling (including farmers)

Summary chain of events



Institute of Virology
Erasmus University Rotterdam
University Hospital Rotterdam

Early dectection system for AI on poultry holdings:

1: Drop in feed and water intake higher than 20%

2: Drop in egg production higher than 5% for more than two days

3: Mortality rate higher than 3% in a week

4: Any clinical sign or post mortem lesions suggesting AIV

Biosecurity measures to reduce the risk of transmission of AI virus:

1: Preventing direct and indirect contact between birds living in the wild and domestic poultry

2: Separation of domestic ducks and geese from other poultry

3: prohibition on keeping of poultry in the open air in areas identified as being a risk for introduction of AI virus

4: Screening of outdoor water reservoirs required for animal welfare reasons for certain poultry against wild waterfowl.

5: Monitoring program for all poultry farms.

Annex C: Differential diagnosis table for poultry

	Many birds affected	Many birds die	Sudden death	Respiratory signs	Discharge from nostrils	Discharge from eyes	Discoloured wattles	Diarrhoea	Tremors / excitement / fits	Weakness / paralysis of a limb	Other nervous signs	Collapse / recumbency	Mouth lesions	Lameness	Foot lesions	Weight loss / thin	Anaemia	Skin lesions	Swollen head	Swollen joints	Other lumps & swellings	Misshapen / thin walled eggs	>50% case fatality	Nearly 100% case fatality	Birds under three weeks old commonly affected	Birds 3 to 12 weeks old commonly affected	Birds over 12 weeks old commonly affected	Report suspicion immediately to CEU and Region	Laboratory or PM confirmation essential?	Post mortem diagnostic	Laboratory test available
Avian influenza / fowl plague	■	◣	◣	■	■		■	■	◣	◣	◣								■				◣		Y	Y	Y	Yes!!	Y		Y
Newcastle disease / Rhaniket disease	■	◣		■				◣		◣	◣			◣					◣			◣	◣	◣	Y	Y	Y			Y	Y
Avian infectious bronchitis	■	◣		■	■	◣													◣			■		◣	Y	Y	Y		Y		Y
Avian infectious laryngotracheitis	■	◣		■	■	◣													◣					◣	Y	Y	Y		Y	Y	Y
Avian mycoplasmosis / CRD	■			■	■	■													◣										Y		Y
Fowl cholera (P. multocida)	◣	◣	■	◣			■	◣															■	■		Y	Y			Y	Y
Erysipelas of poultry			■					◣		◣								◣					◣	◣					Y		Y
Infectious coryza				■	■	◣		◣											■							Y	Y		Y	Y	Y
Syngamus trachea			◣	■												■													Y	Y	Y
Avian trichomoniasis				■		■							■			◣													Y	Y	Y
Avian chlamydiosis				◣	■	■		◣								■													Y	Y	Y
Coccidiosis	◣	◣						■								◣									Y	Y			Y	Y	Y
Pullorum disease (Bacillary white diarrhoea)	◣	◣						■															■		Y				Y	Y	Y
Fowl typhoid (S. gallinarum)	◣	◣						■												◣			■		Y	Y	Y		Y		Y
Infectious bursal disease (Gumboro)	◣	◣						■		■		■														Y			Y	Y	Y
Avian encephalomyelitis									■	■		■								◣					Y				Y		Y
Botulism	◣	◣	◣					◣		■		■						◣					■	◣	Y	Y	Y		Y		Y
Avian colibacillosis			◣	◣								◣		◣						◣					Y	Y	Y		Y	Y	Y
Internal parasites																■	◣									Y	Y			Y	Y
External parasites (mites, lice, ticks)																■	◣								Y	Y	Y				Y
Avian lymphoid leucosis																■											Y		Y	Y	Y
Avian tuberculosis																■											Y	Yes!!	Y	Y	Y
Leucocytozonosis	◣	◣						◣	◣		◣						■						◣		Y	Y			Y	Y	Y
Chicken anaemia virus infection																	■								Y			Yes!!	Y	Y	Y
Fowl pox				◣									◣					■			■				Y	Y	Y			Y	
EDS 76																						■					Y				Y
Marek's disease	◣	◣								◣		◣		◣				◣			◣					Y	Y		Y	Y	Y
Mycotoxicosis / Aflatoxicosis	◣	◣				◣	◣					◣	◣			◣										Y	Y		Y	Y	Y
Staphylococcal infection in poultry														◣						◣					Y	Y	Y		Y	Y	Y
Avian salmonellosis (other)	◣	◣						◣		◣						◣									Y	Y	Y		Y		Y
Poisoning	◣	◣		◣					◣						◣			◣			◣		◣	◣	Y	Y	Y				
Duck virus enteritis	■	■	◣		■			■		■													■	■	Y	Y	Y	Yes!!	Y	Y	
Duck viral hepatitis	■	■	■						■	■	■	■											■	■	Y	Y		Yes!!	Y	Y	

Key:

■ Almost always present

◣ May be present

Not present

Lessons learned from A.I.

- Training of staff
- Materials, facilities
- Make contracts during peace time
- Contact structure,
- Use the information of the integrations
- Early detection of LPAI
- More and more opposition from society for killing ‘healthy animals’
- Discussion about the risk of free range holdings
- Public Health
- Evaluation

Schmallenberg 2011

Unexplained disease outbreak cattle

August/September 2011

reports to AHS of cattle with diarrhoea, fever, milk drop

Same problems found in Germany

Clinical and laboratory investigations: no agent detected

Discussed in human/ veterinary signalling forum

Discussed at Ministry EL&I

No zoonotic consequence and not a notifiable disease
no action from the government

Chronological order of events

19 November: FLI reported new Orthobunya Virus, test transferred to the CVI Lelystad

Monitoring program AHS 25 November- 7 December: 4 farms with lambs with congenital defects.

Standard diagnostics methods, examination foetus and blood and tissue samples

CVO was informed on 7 December;

- no action yet
- discussion on new virus related to Akabane virus
- possible relation between diarrhoea cattle and malformed lambs

Chronological order of events

Virus detected in blood samples from cattle on 8 December

16 Cases of lamb malformations reported 12-15 December

Contact with CVO's in neighbouring countries

CVI detects 'Schmallenberg-virus' in brains of two lambs, by RT-PCR on 15 December

Meeting with researchers, policymakers and CVO on 16 December

Letter to parliament on 16 December

Clinical signs

Congenital defects:

- *Arthrogryposis*
- *Hydranencephaly*
- *Ankylosis*
- *Torticollis*
- *Scoliosis*

Schmallenberg in sheep

Lambs are mainly born at 135-151 days; normal 147

Lambs are sometimes born alive, mostly not viable

2 to 40% of the animals affected

4 Farms also had a lambing period in November; in all cases without problems

All categories

- synchronised and non-synchronised
- Hobby and commercial farms
- All breeds

Detection of ‘Schmallenberg-virus’ in cattle

50 blood samples from 8 farms from cattle showing clinical diarrhoea, fever and reduced milk yield tested

On December 8th, 18/50 blood-samples tested positive in RT-PCR

None of blood samples of controls positive: 0/115

Conclusion: ‘Schmallenberg-virus’ associated with clinical diarrhoea cattle East-Netherlands, Sept/Aug

Measures taken by Authorities

Frequent reporting to Dutch Parliament, European Commission, OIE, sector and public at large

Close relations with neighbouring countries: BEL, LUX, GER, FRA and UK

- **CVO level**
- **Among scientists**

Mid December Minister of Agriculture decides to:

support additional research

make the disease notifiable

Notifiable disease

December 20th, 2011

Farmers and veterinarians are obliged to notify ***congenital malformations in sheep and goat lambs and calves***

Aim:

- **To support the epidemiological surveys**
- **To gain knowledge**

February 2nd, 1012

Employees of laboratories are obliged to notify ***positive lab results***

Aim:

- **To be informed about positive lab investigations on clinical cases other than malformations in lambs and calves**

Procedure after notification (I)

Lambs / calve with congenital malformations will be transported to the Animal Health Service for post mortem examination

- Arthrogryposis
- Ankylosis
- Malformations of one or more legs
- Torticollis
- Scoliosis
- Kyfosis

2. *NVWA Official Veterinarian visits the farm*
   - *inventarization of all animals present at the farm*
   - *clinical inspection, the dam concerned especially*
   - *serum sample of the dam*
   - *questionnaire farmer*

Procedure after notification (II)

3. *Serum sample and post mortem samples will be send to the Central Veterinary Institute in Lelystad*
   - Immediate PCR on brain tissue
   - Serum sample will be stored until a test for anti bodies will be available

4. *Daily an updated overview of all notifications and a map of The Netherlands with the locations of all infected holdings will be placed on internet (www.vwa.nl).*

Some clinical findings

On infected holdings about 30% of the lambs born have malformations.

Within one delivery lambs are born with malformations as well as healthy lambs

The severity of the malformations varies from slight malformations to severe malformations

During the last week almost no lambs with malformations have been born

One of the positive calves was a twin, the other calve was found negative for Schmallenberg

BLUETONGUE
The Netherlands 2006 - 2008

© GD Deventer

History

14-08-2006: notification by a private veterinarian of 4 suspected cases of bluetongue

14-08-2006: animal disease specialist team visits 2 suspected holdings

15-08-2006: CIDC-Lelystad reports positive PCR test and positive Ab-ELISA for both holdings

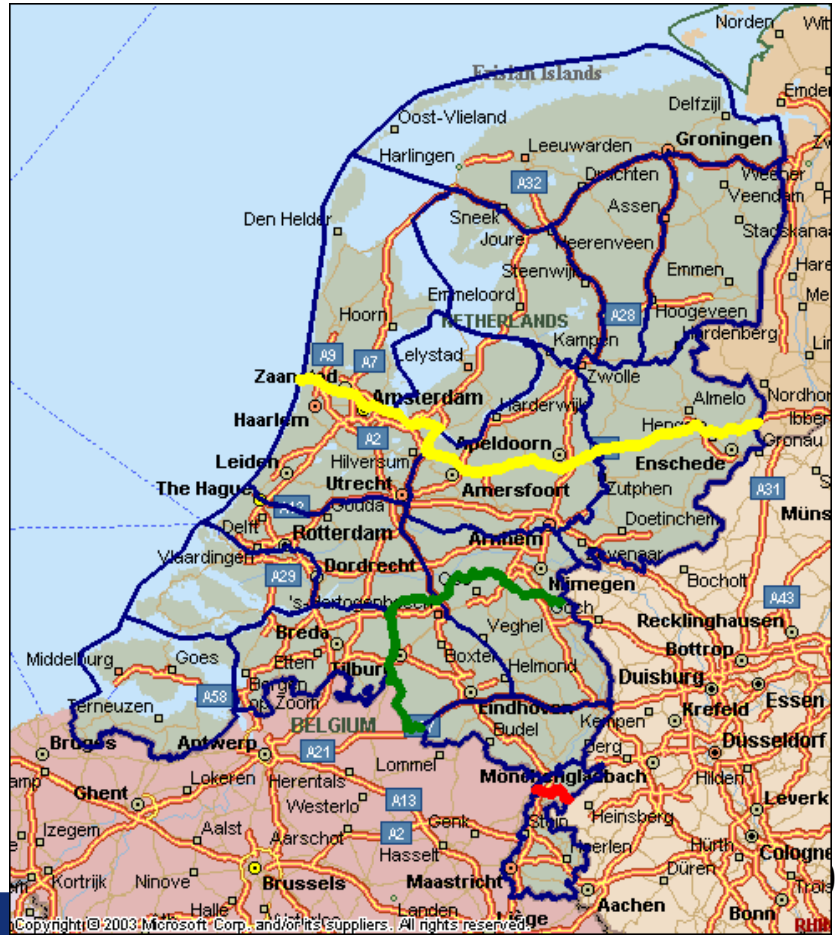
17-08-2006: confirmation of the PCR test and Ab-ELISA by Pirbright Laboratory

Restricted areas
(Directive 2000/75/EC)

150 km surveillance zone

100 km protection zone

20 km screening area



Measures
20 km screening

Transport ban for all ruminants

Ruminants have to be confined at times the vectors are active (dusk to dawn)

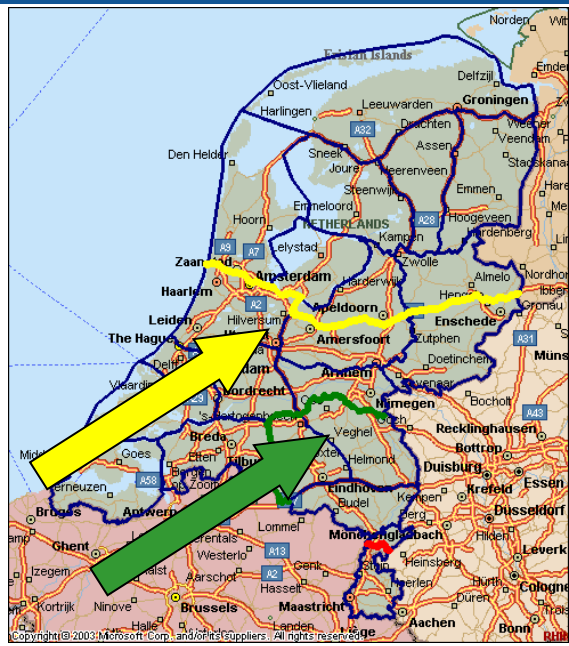
Ruminants, stables an their surroundings have to be treated with insecticides

Periodically screening of all holdings with ruminants within this area

On holdings with sheep: clinical examination

On holdings with cattle: additionally serum samples will be taken

Measures 100 km and 150 km restricted zone



Transport of ruminants is only allowed within the restricted area

Advice to confine ruminants at times the vectors are active (dusk to dawn)

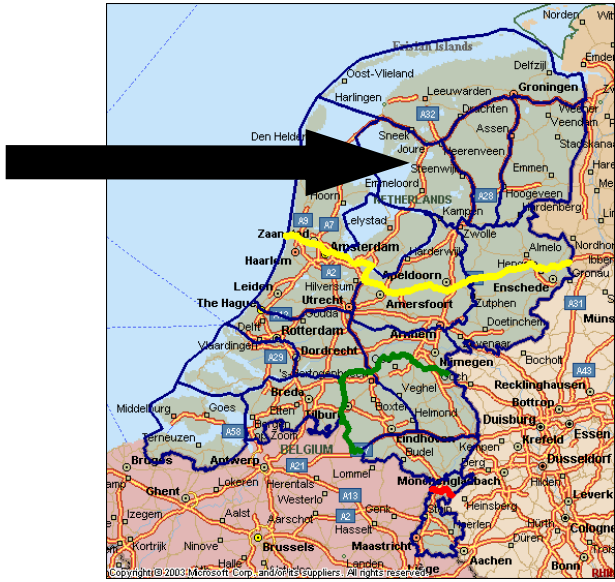
Advice to treat ruminants, stables, and their surroundings with insecticides

A program will monitor the presence or the absence of bluetongue virus in vectors and cattle

Measures remaining part of NL

NATIONAL MEASURE:

Export ban for ruminants, semen, ova and embryo's

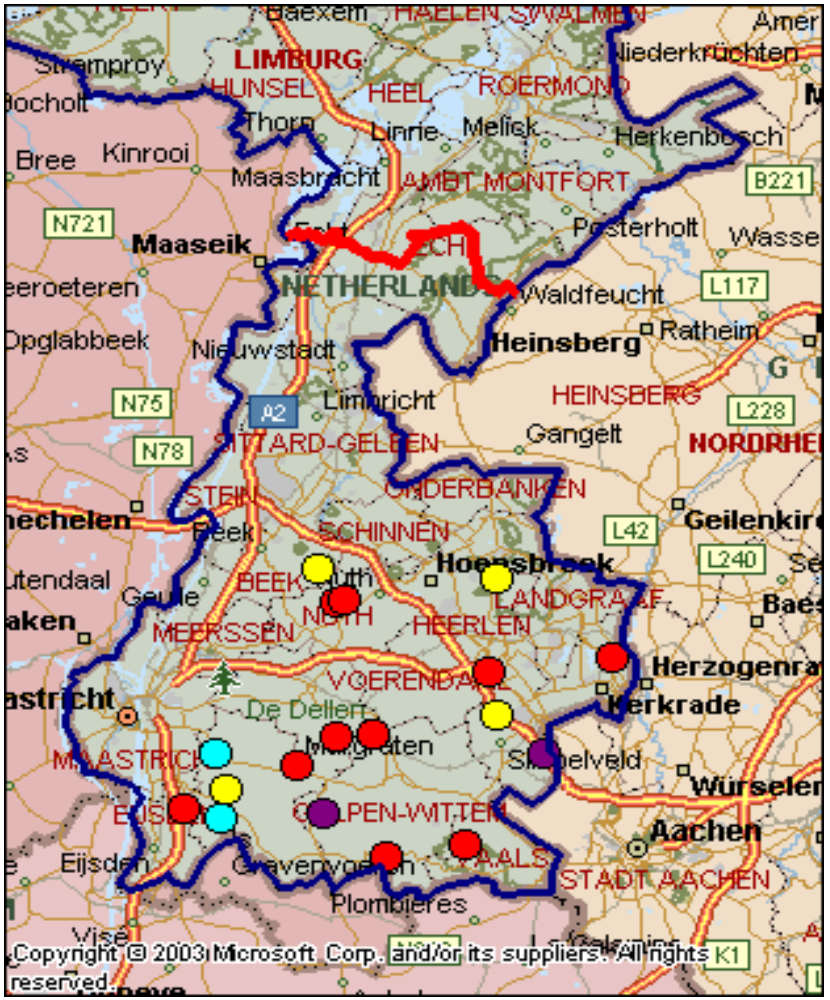


Infected area / holdings

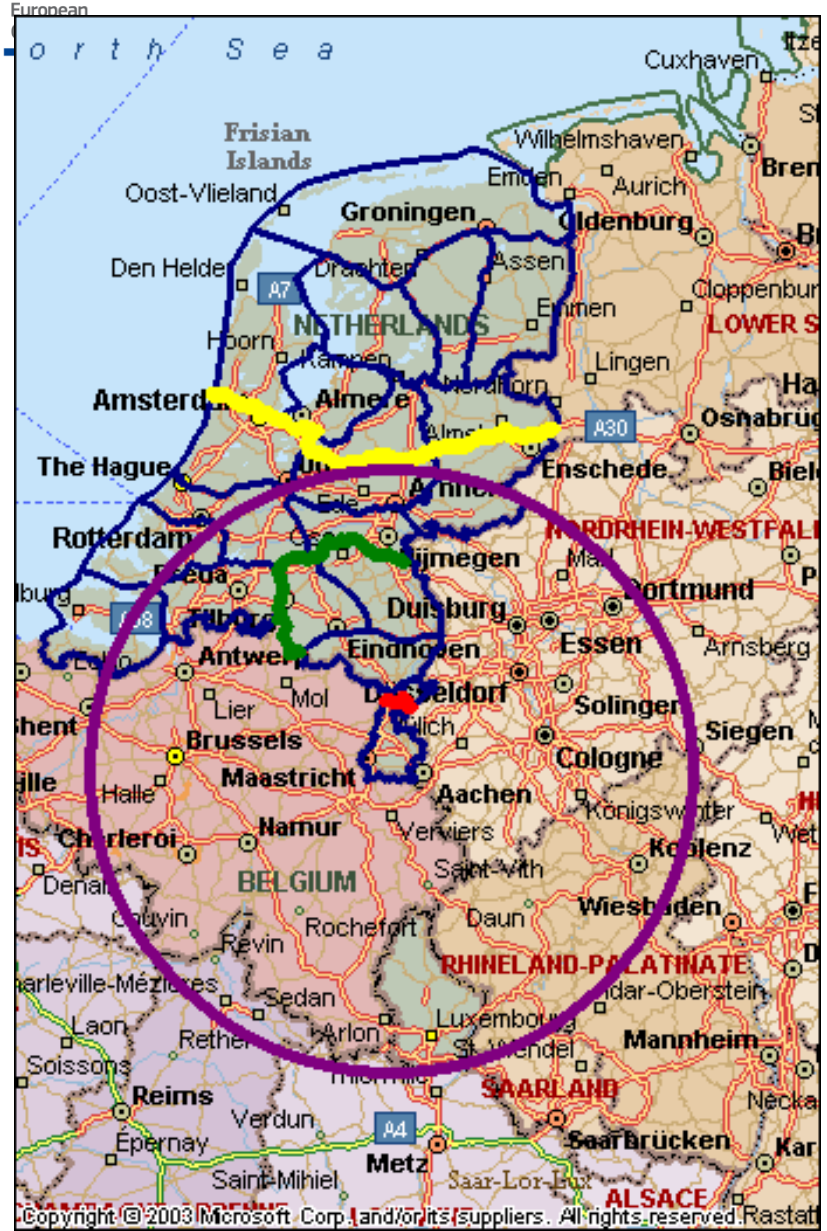
Till: 20-08-2006, 12:00 hrs:

12 holdings have been infected, all located within the southern part of the province Limburg

Infected holding (sheep)
Infected holding (cattle)
Suspected holding (sheep)
Suspected holding (cattle)



A disease with major international consequences . . .



Measures BTV 2007

Entomological investigation:

To determine the population dynamics and over-wintering features of the Culicoïdes species in the Netherlands

To define the geographical distribution and abundance of various Culicoïdes species in the Netherlands

Entomological investigation

Entomological surveillance

- at least 1 trap per geographical unit

- South African Onderstepoort model traps (ultralight)

- at least one night per week throughout the year

- traps placed close to sentinel animals if possible

Geographical units

Compartments (ADNS)

Area of approx. 2.000 km²

(45 x 45 km)

With maximum of 3.000 km²

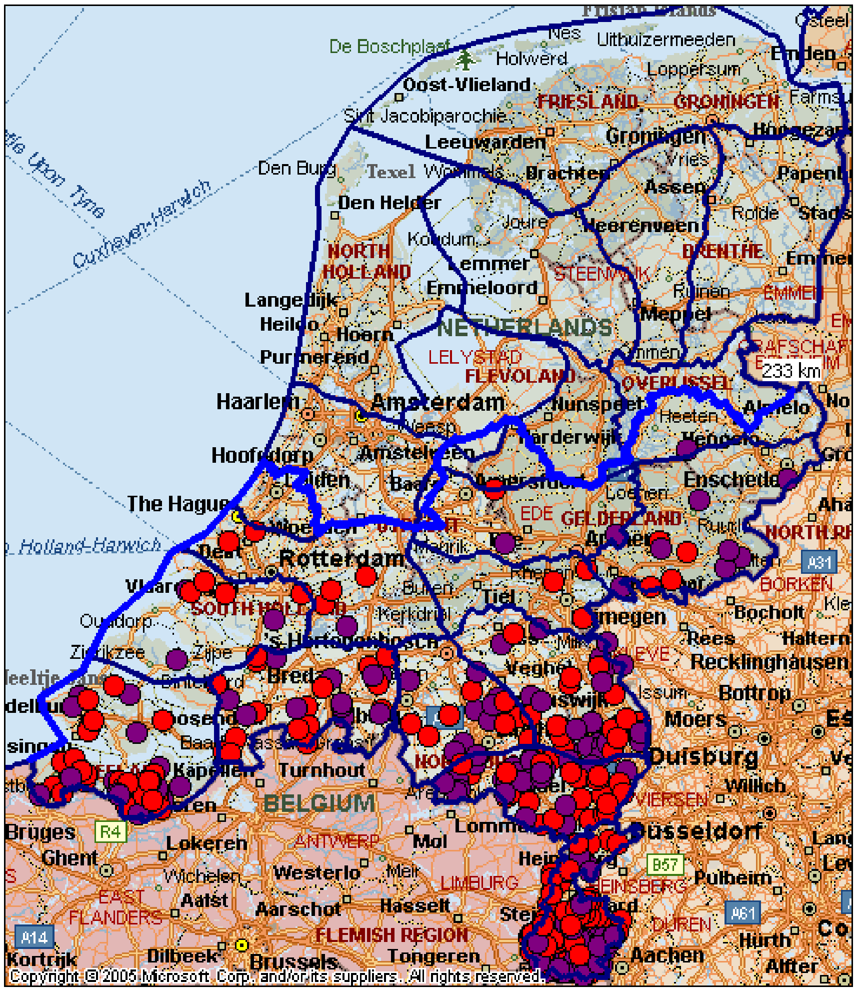
Compartment 1 will be devided into 1a and 1b

European Commission

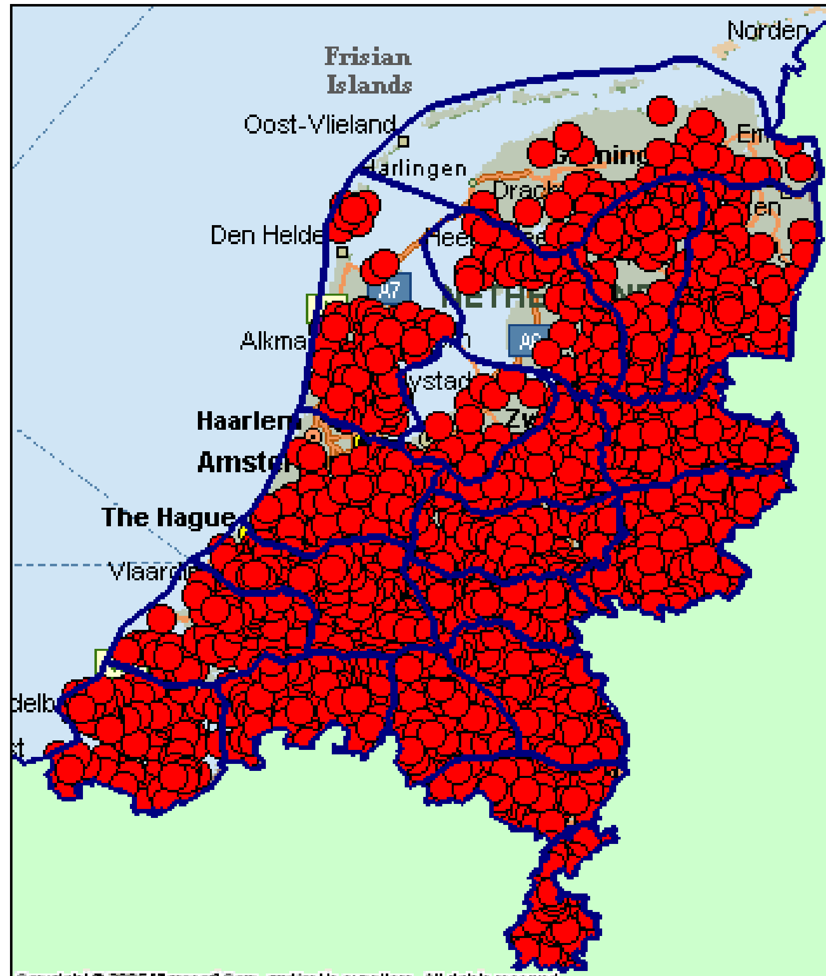
European Commission

European Commission

BT per 31-12-2006



BT per 31-12-2007



BTV 2007

Compared to 2006

Clinical signs cattle more severe,mortality sheep higher

Start of outbreak in multiple areas in south of the Netherlands

Faster spread,more cases, more culicoïdes in traps(approx.10x)

BTV 2007

Conclusions:

BTV 8 will return each summer for coming years

Over-wintering mechanisms BTV8 are still unknown

Only vaccination in a moreyears program will eradicate BTV8

Threat of the Southern Europe BTV serotypes

Situation BTV 2008

Vector free period : 12 december 2007 till 22 april 2008

Vaccination BTV 8 vaccin started May 2008 (voluntary)

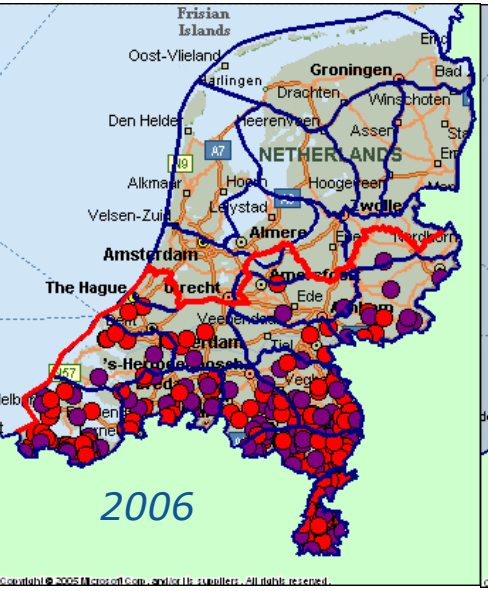
First infected holding: 1 August 2008

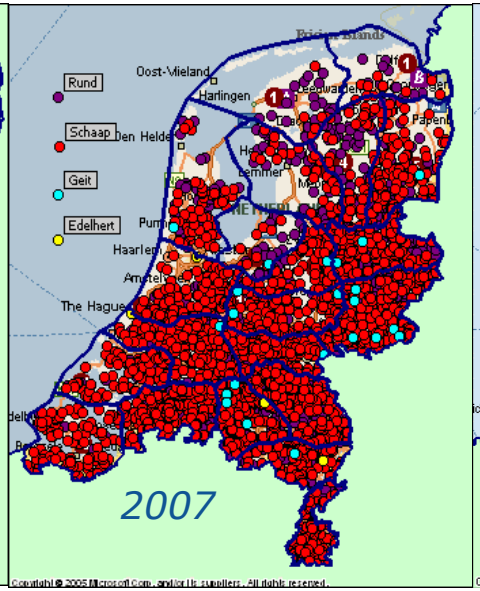
Total amount infected holdings (1October 2008) : 41

Threat BTV serotype 1 spreading from Southern Europe to the North

BT 2006 – 2009

2006: 456 infected farms
2007: 6.453 infected farms
2008: 66 infected farms *Type: 8*
2009: 0 infected farms *Start vaccination: April 2008*





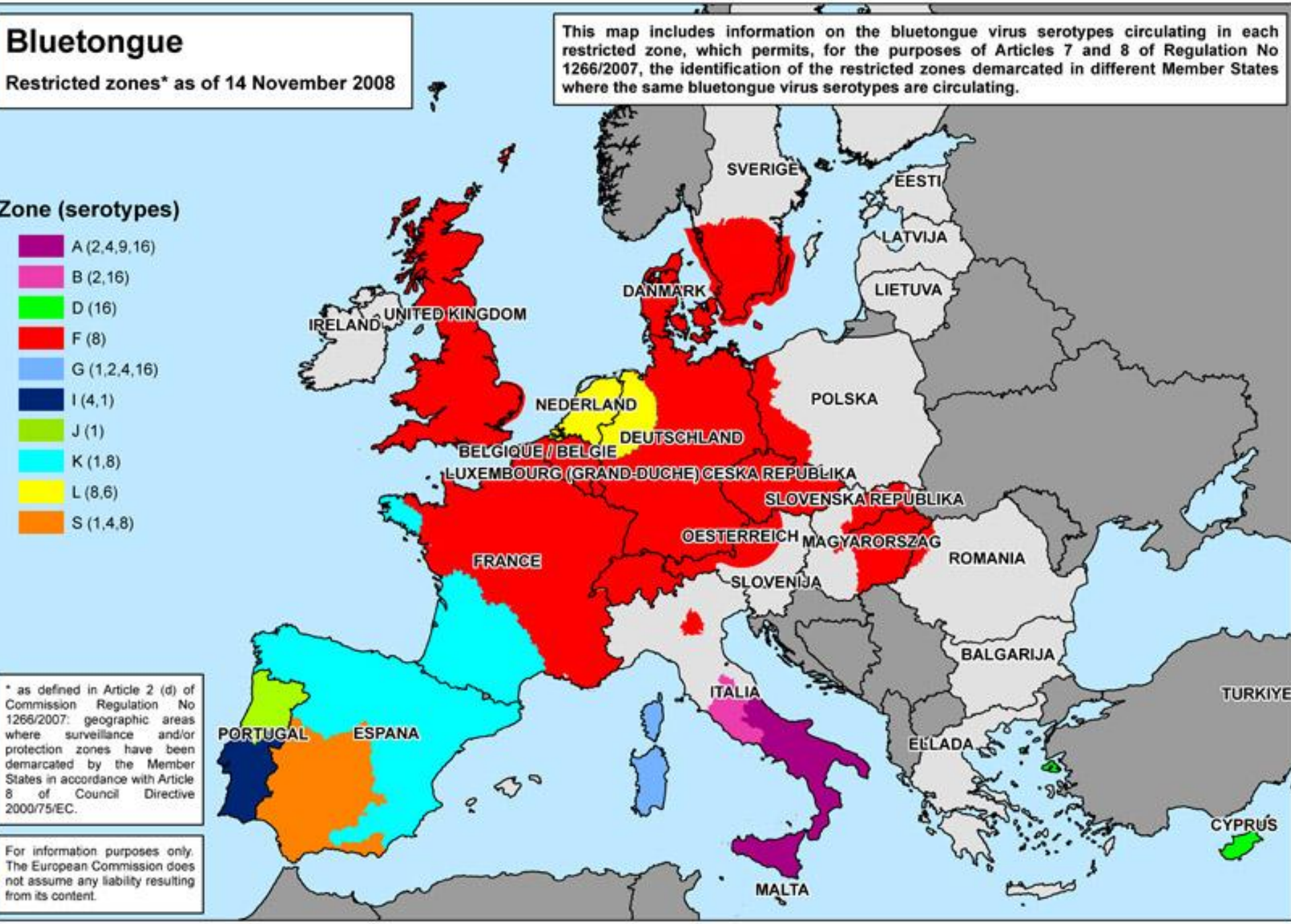
Vaccination against BT serotype 8

Target is 80% coverage of BT-susceptible population.

Before the start of the vaccination program the over all prevalence in the Netherlands was more than 60%.

In the south of the Netherlands, in some compartments the prevalence was more than 90%.

Vaccination was most important in the north of the Netherlands.


Bluetongue
Restricted zones* as of 14 November 2008
This map includes information on the bluetongue virus serotypes circulating in each restricted zone, which permits, for the purposes of Articles 7 and 8 of Regulation No 1266/2007, the identification of the restricted zones demarcated in different Member States where the same bluetongue virus serotypes are circulating.
Zone (serotypes)
A (2,4,9,16)
B (2,16)
D (16)
F (8)
G (1,2,4,16)
I (4,1)
J (1)
K (1,8)
L (8,6)
S (1,4,8)
* as defined in Article 2 (d) of Commission Regulation No 1266/2007: geographic areas where surveillance and/or protection zones have been demarcated by the Member States in accordance with Article 8 of Council Directive 2000/75/EC.
For information purposes only. The European Commission does not assume any liability resulting from its content.
SVERIGE
EESTI
LATVIJA
LIETUVA
DANMARK
IRELAND
UNITED KINGDOM
NEDERLAND
POLSKA
DEUTSCHLAND
BELGIQUE / BELGIE
LUXEMBOURG (GRAND-DUCHE)
CESKA REPUBLIKA
SLOVENSKA REPUBLIKA
OESTERREICH
MAGYARORSZAG
ROMANIA
FRANCE
SLOVENIJA
BALGARIJA
ITALIA
TURKIYE
PORTUGAL
ESPANA
ELLADA
CYPRUS
MALTA

Classical Swine Fever

- Viral infections
- Fever more than 41°c
- High morbidity, lethality will depend on the virus subtype involved (clade 1 and clade 2.3)
- Domestic pigs and wild boars sole susceptible species
- EU stamping out policy
- Bordering countries Vaccination with alive C strain
- Vaccine Abs are not distinguishable from the ones induced by the wild virus

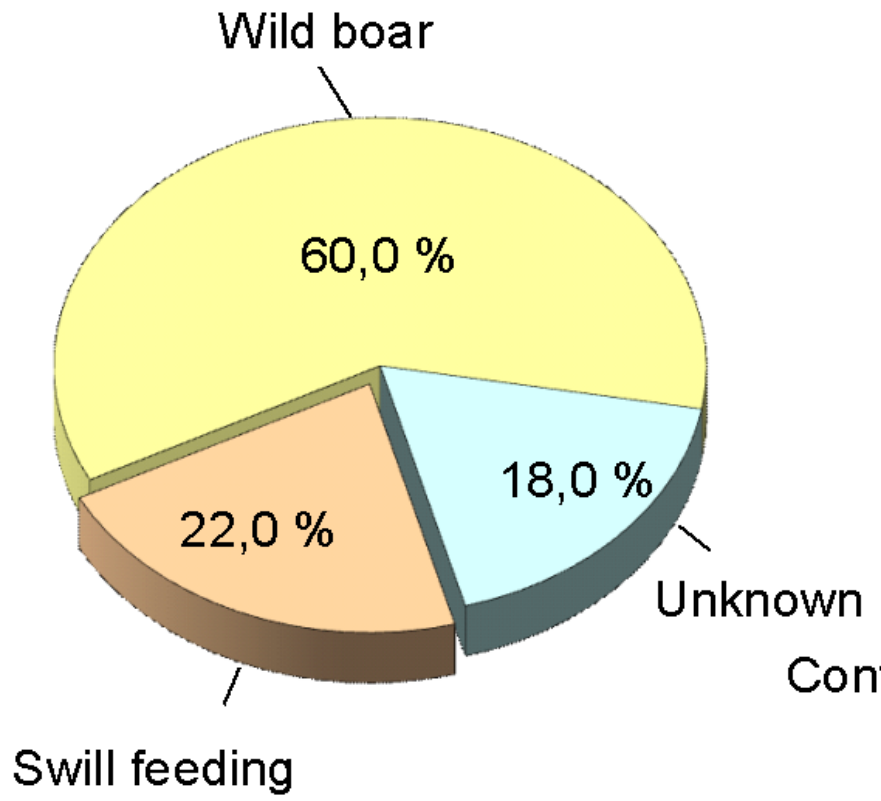
A CSF outbreak in wild boars

- Early detection
- Which strategies, which samples? Which risks?
- OUTBREAK management
- Infected area
- Surveillance area
- Hunting *vs.* non hunting
- Domestic pigs
- Active and passive surveillance

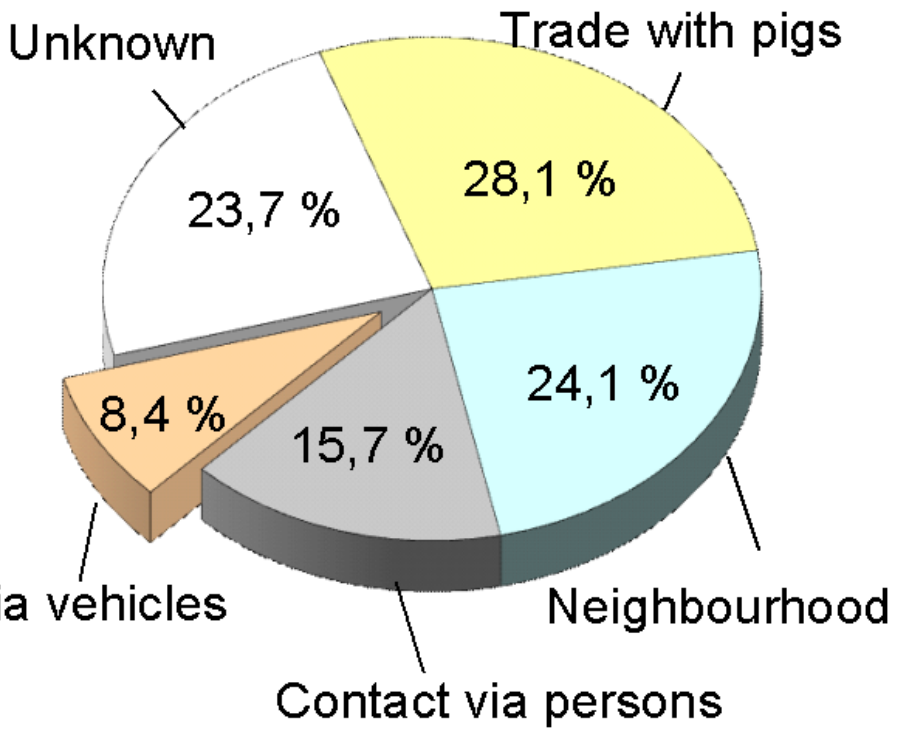
CSF in wild boars (2)

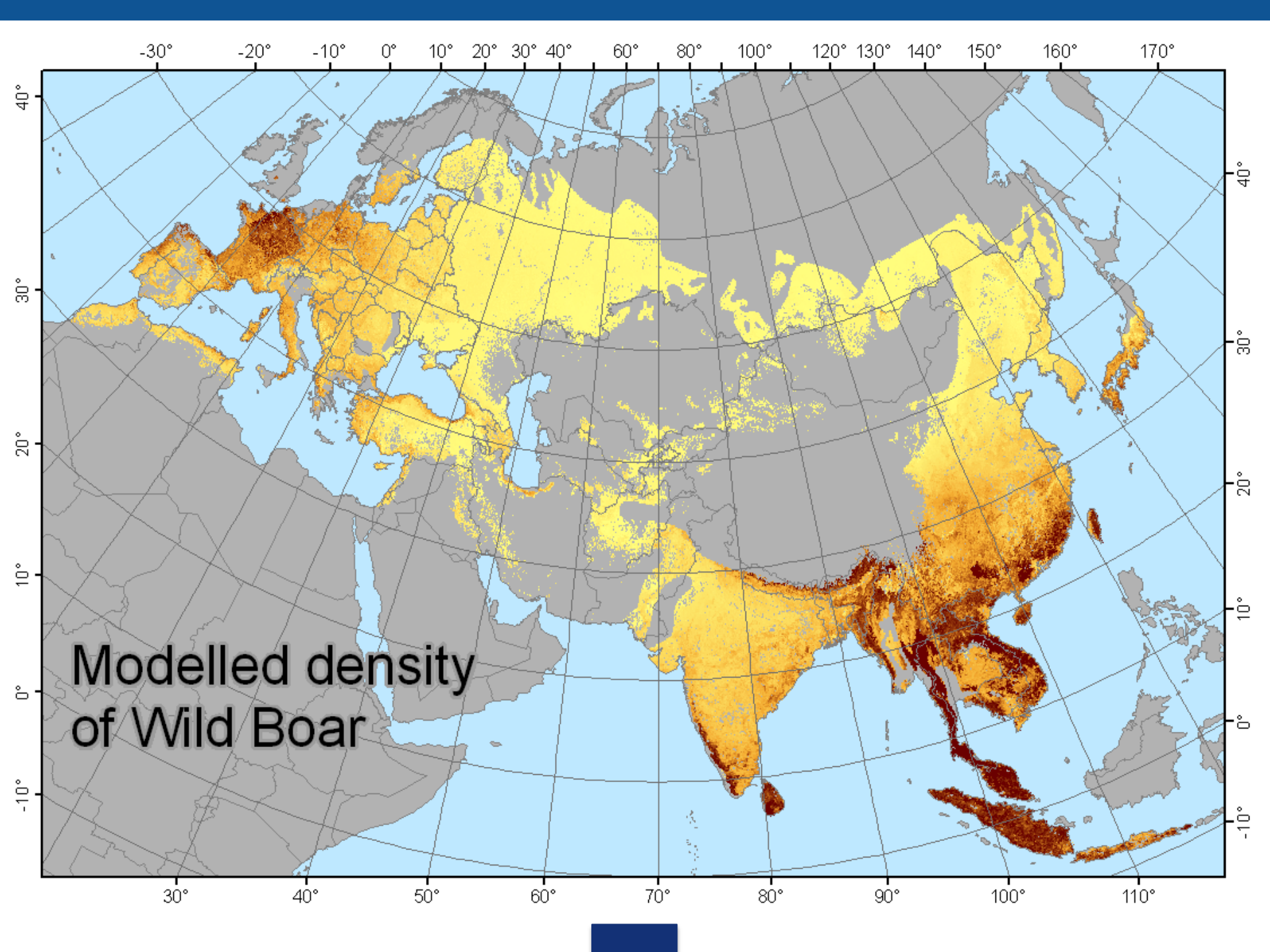
- Hunting and infection management
- Depopulation: what does it mean?
- Vaccination (yes or no? When and why?)
- Lifting measures
- Official free area definition (theory vs. practice)

Primary outbreaks (n = 111)

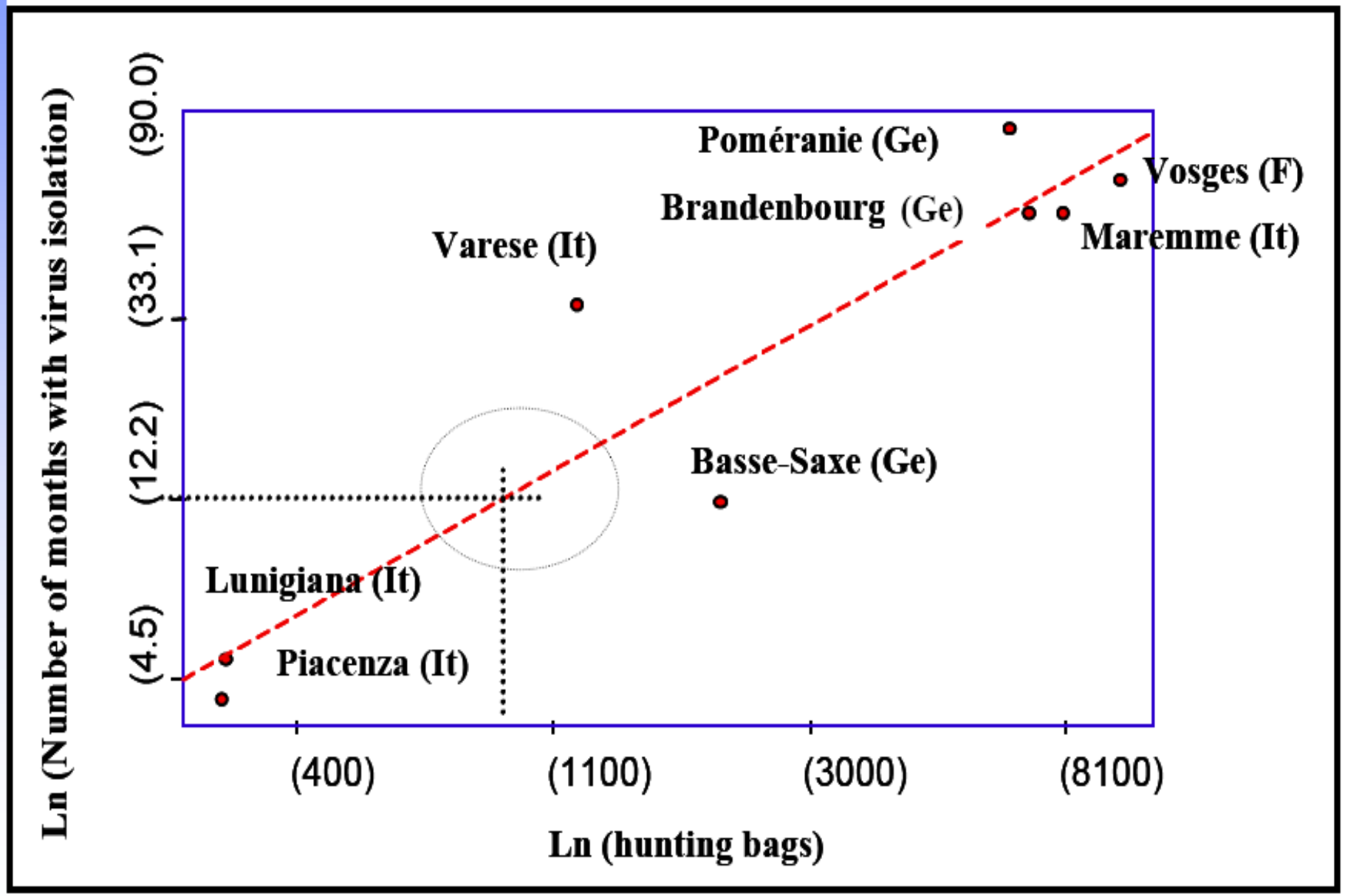


Secondary outbreaks (n = 249)




Modelled density
of Wild Boar

Rossi *et al.* (*2005*) Rev. Epidemiol. Infect.



European Commission

How many susceptible wild boars are needed for the starting of the infection?

Italy-Suisse = 0.58/km²

MWP (Germany) = 0.97/km²

Sardinia = 0.8/km²

Luxembourg = 1.12/km²

Area	R0	Nt	CCS/year	CCS/long persistence
Germany	6,3	0.58/km²	1800	4000-6000
Italy-Suisse	4.7	0.97/km²	1000	3000-4000
Louxembourg	14.5	1.12/km²	2300	6000-8000

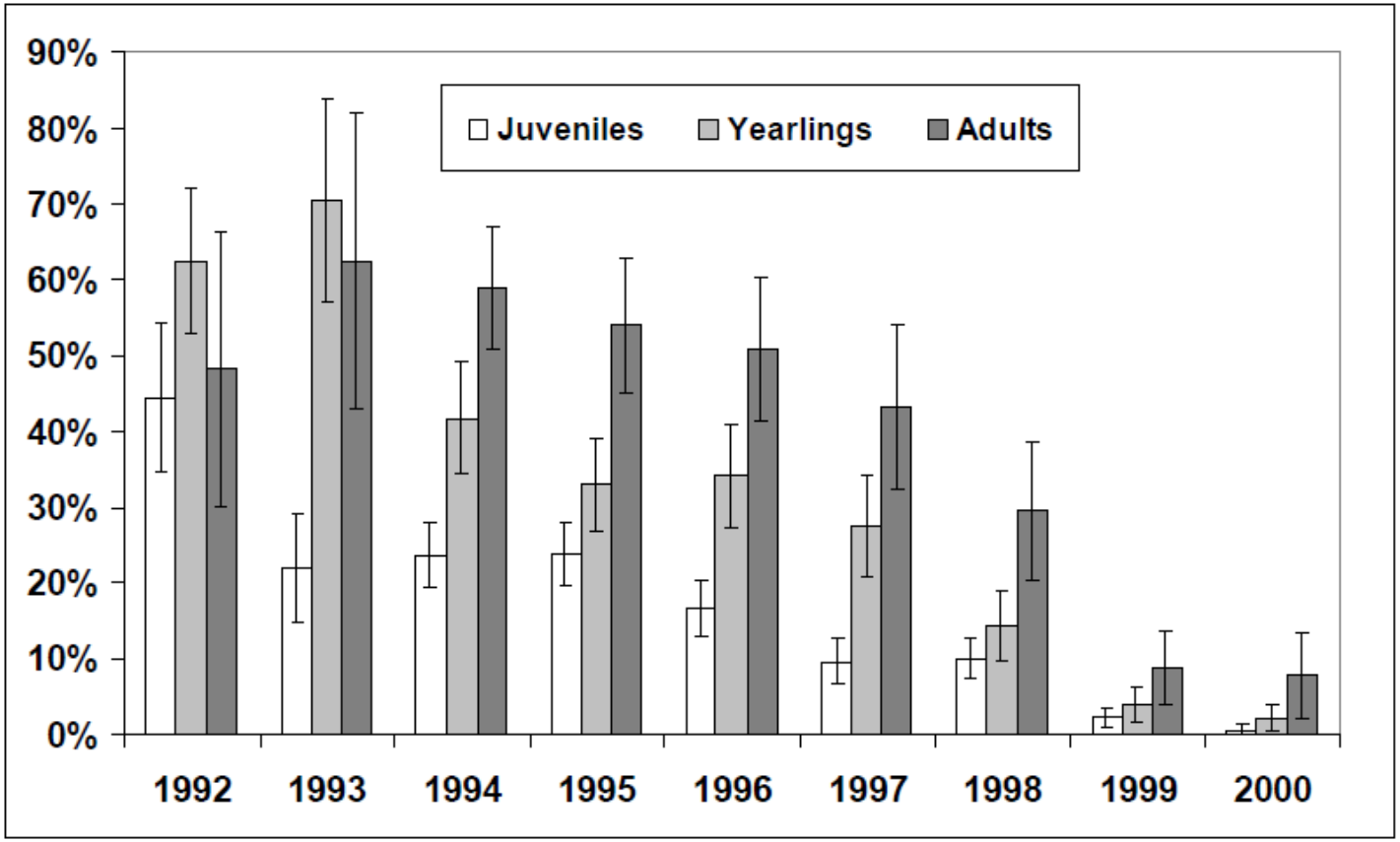
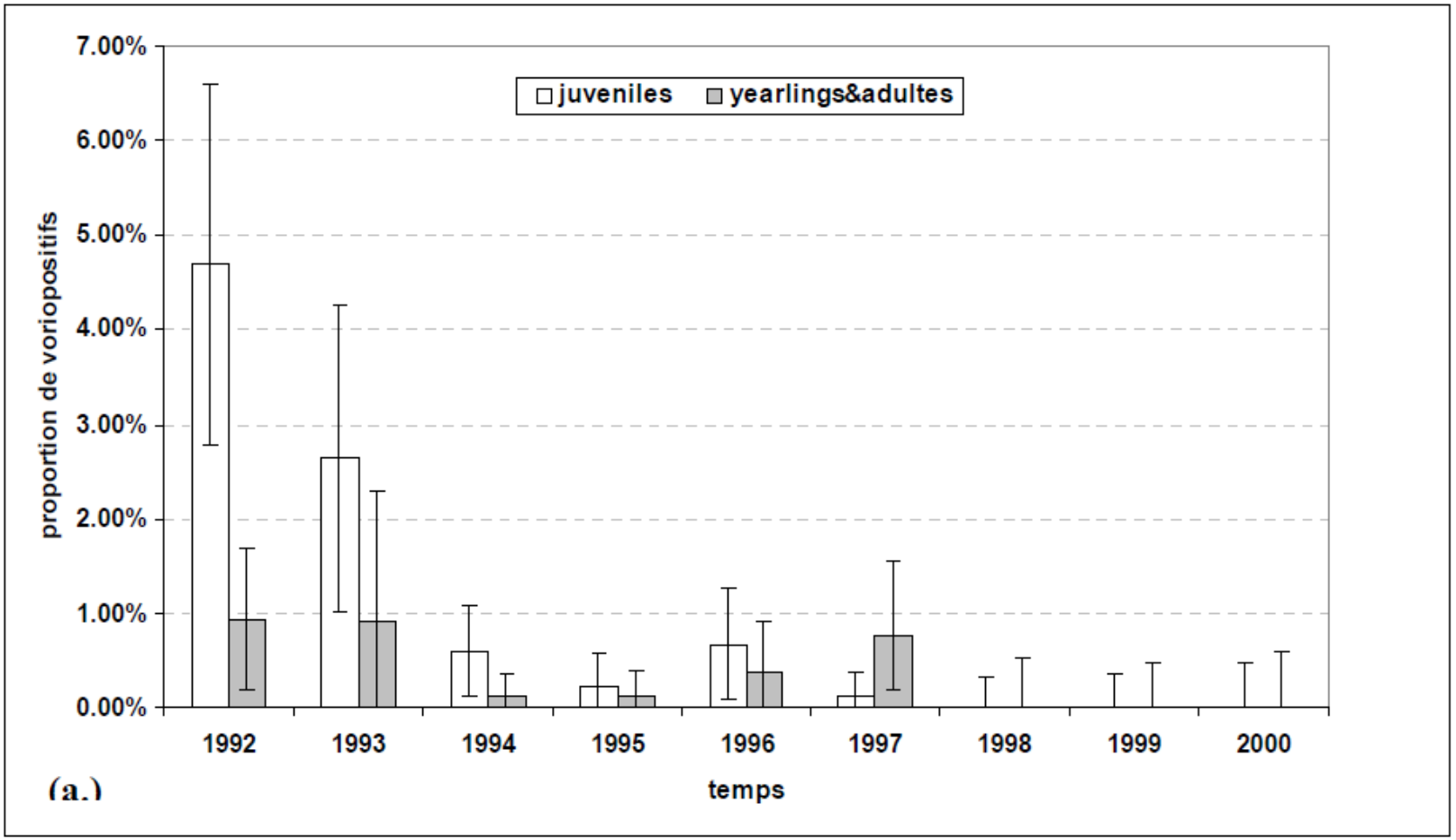


Figure II-4 : Evolution de la proportion d'animaux séropositifs (immunisés) entre 1992 et 2000, dans les différentes classes d'âge, d'après les prédictions du modèle logistique. Les intervalles de confiance à 95% sont représentés par des moustaches.


7.00%
6.00%
5.00%
4.00%
3.00%
2.00%
1.00%
0.00%
proportion de voriopositifs
juveniles
yearlings&adultes
1992
1993
1994
1995
1996
1997
1998
1999
2000
temps
(a.)

Which methods could be used to control/eradicate the infection?

- Seat and wait strategy
- Depopulation
- Vaccination

Seat and wait strategy

- It works very well
- In isolated wild boars populations
- It works better when applied into high density wild boars area (spread rate incremented)
- It could be reasonably applied in populations with an hunting bag of about 1000 animals (approximately 1000 pre-reproductive adult individuals)
- The degree of “isolation” is more important than density and the size of the population

DEPOPULATION

- A number of animals have been eliminated
- The remained density and the size of the population will be so low that an INFECTIOUS INDIVIDUAL will not contact any susceptible individual in due time to transmit the infection
- Threshold theory
- How long is the infectious period ?

Dataset	Years	Surface (Km^2)	Wild boar density/Km^2	% of individuals to be culled instantaneously to eradicate the virus
Mecklenburg Western Pomerania	*1993-1996*	*5196*	*6.1*	***72%***
Luxemburg	*2002-2003*	*2182*	*3.2*	***47.5%***
Varese Province	*1997-2002*	*370*	*3.2*	***53.2%***
Rhineland Palatinate	*1999-2002*	*247*	*5.1*	***66.7%***

Hunting and CSF outbreak management in wild boars

- **Absence of hunting** doesn't produce significant changes in virus persistence or spread;
- Only **high rates** > 70-80% could reduce significantly the virus persistence and spread (local extinction of wild boar)
- **Usual hunting rates** (~ 40%) reduce slightly the virus persistence but increase the epidemic peak (number of infected);
- **Small increase** in hunting rates (~ 60%) can promote virus persistence and spread;

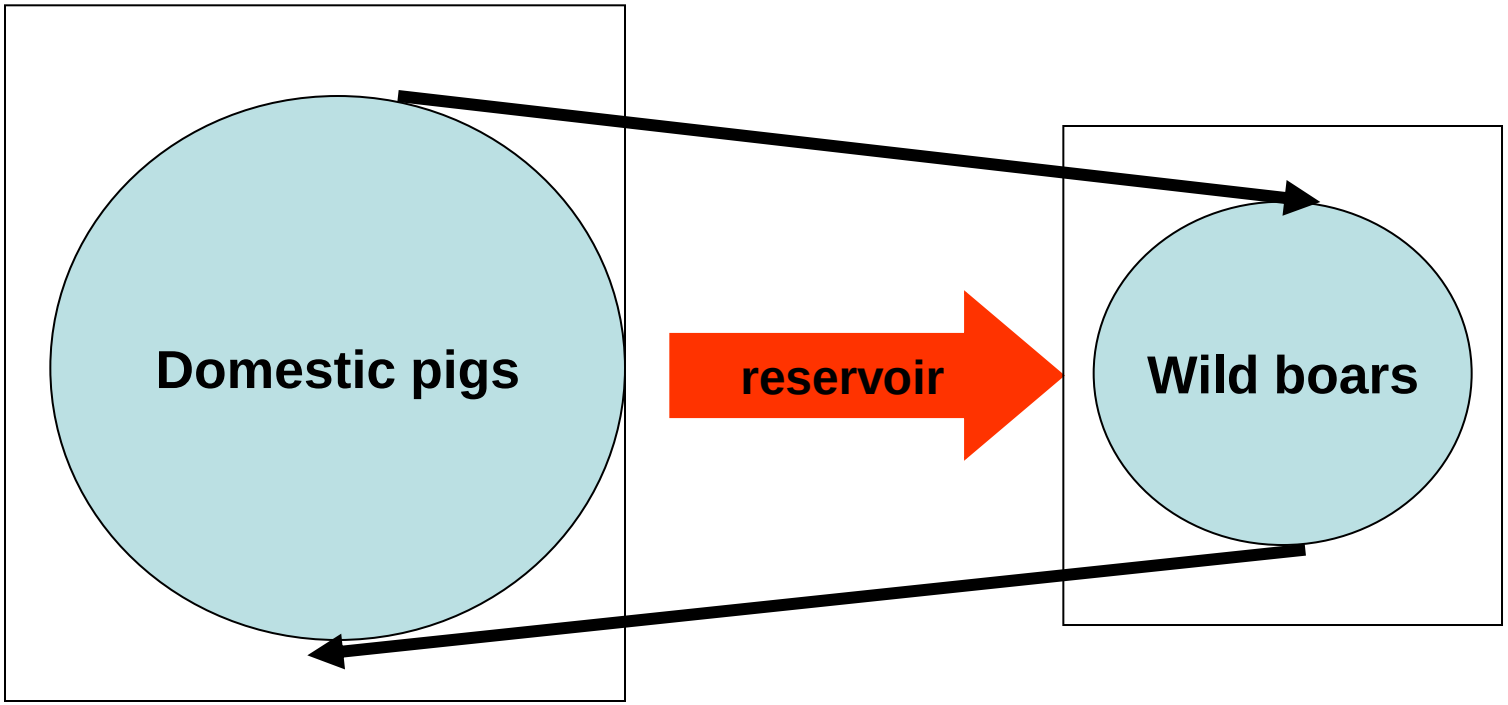
Vaccination

- When vaccination is worth to be planned and done?
- How vaccination prevents the spread of the infection?
- How is conducted?
- When to stop it?

First fundamental step

To determine the role played by the wild boar in the epidemiology of CSF

Mixing of susceptible species/populations



Then if:

- *The infected wild boar population is proven to represent the TRUE epidemiological reservoir of the virus*

- *The density (> 1-2 Km^2), the size (>4-6000) and the geographical distribution (>1000 Km^2) of the infected wild boar population are all compatible with a long lasting of the virus*

YOU CAN START TO THINK TO VACCINATION

Vaccination: how does it work?

- Does not eradicate the infection in the infected group

- Vaccination - progressively - reduces the probability that the virus spread among different wild boars group

- More you vaccinate, more the immune status of vaccinated groups will prevent the introduction of the virus breaking the infection chain

Classical Swine Fever

SCHWEINE
WILDSCHWEINEN
-
BEOBACHTUNGSZONE
Sc
PE
CHEZ
ONE D'OBSERVATION
-
ransport et commerce
de porcs réglementés

Vaccination: how is it performed?

- Vaccine is administrated orally, blisters are included in aromatized maize flower baits;
- Each vaccine baits contains several doses (till seven) of the C strain vaccine
- 1-2 vaccination grounds each Km^2 (50 m^2)
- 30-40 vaccine baits for each vaccination ground
- Vaccine baits are buried at 10 cm.
- Wild boars are previously fed with buried maize

Vaccination: how is it performed?

- Vaccination baits are distributed twice (15 days interval) during each vaccination campaign
- 2-3 vaccination campaigns each year
- The **vaccinated area** is considered **as infected**

Vaccination: what does not work ?

- Piglets (striped animals) do not eat the vaccine baits
- Vaccine antibodies are not distinguishable from antibodies due to virus contact
- Many stochastic factors highly affect vaccination efficacy

Vaccination: when to stop it?

At present the sole available "strategy" is the "seat and wait" one. It consists to stop vaccination after a time series of negative virus samples. In general after a NOT-CODIFIED period it is decided to stop vaccination and then to continue to sample in order to verify the presence of the virus. This strategy poses serious risk: vaccination could be stopped despite the presence of the virus in the environment. The presence of undetected virus can be possible due to the very huge sample size required to detect the virus at a very low prevalence (<1%; 95%C.L.). Moreover the epidemiological situation is characterized by a very high population immunity (past/present infection + vaccination) and by the presence of a very limited number of still susceptible individuals that can host the virus at a very low prevalence. The probability to find the virus trough sampling is almost zero.

- Vaccination is a sensible tool for eradication;
- Rarely vaccination in itself can eradicate the infection in the actively infected area
- Primarily, vaccination prevents the spread of the infection in neighbouring patches (promoting herd immunity in free areas)
- Effectiveness of vaccination increase for **each trial** ;
- Vaccination always reduces the **epidemic peak**;
- Endemic evolution of infection could occur when a low rate of vaccination is achieved in small areas also

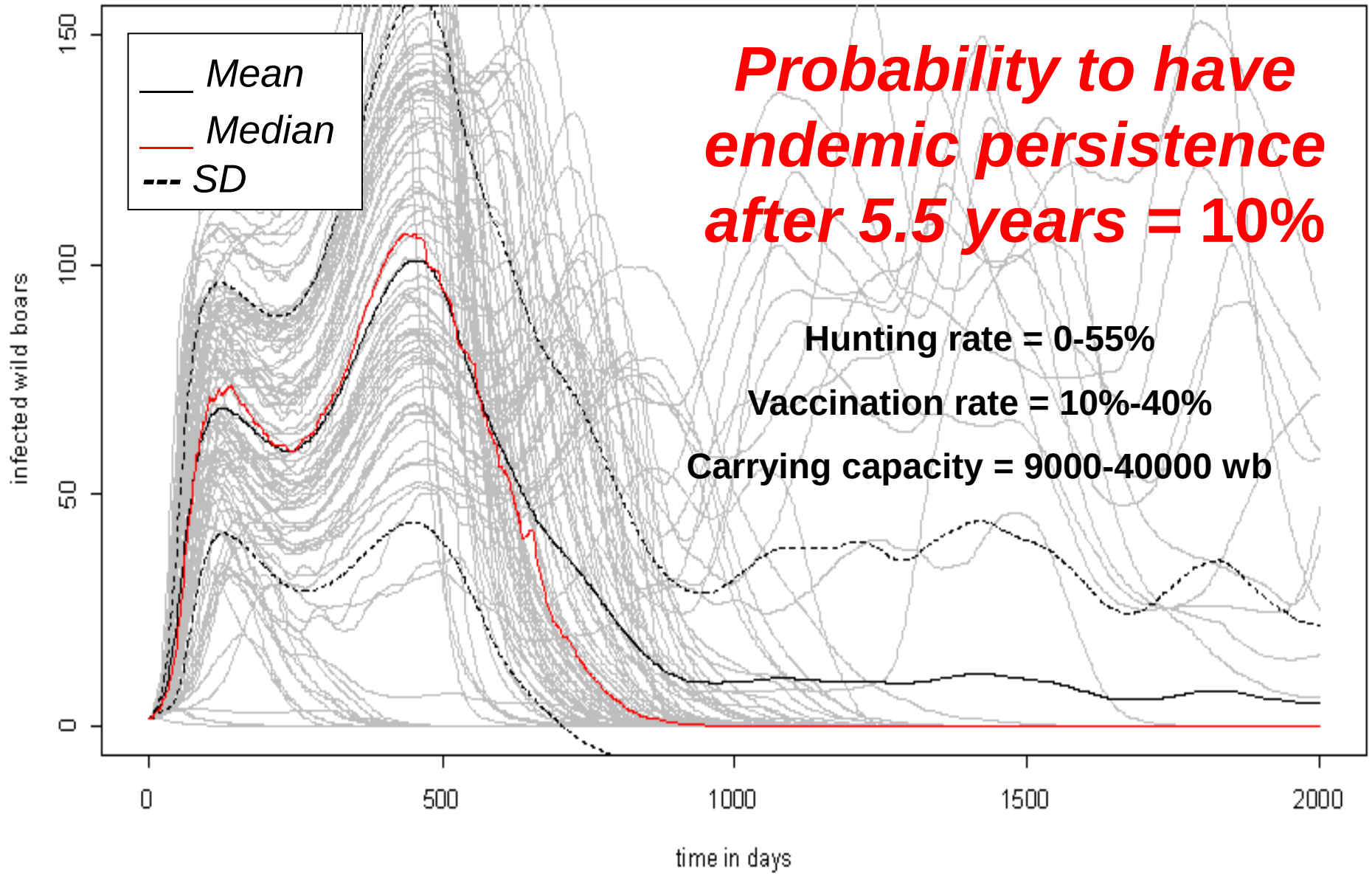
Vaccination and population immunity

- Vaccination of about 20% of susceptible animals results in an increased probability of endemic stability (the infection can spread in neighbouring patches with low incidence)

- Considering the common infection and population parameters a minimum target of 40% of vaccinated should be achieved (40% of susceptible animals);

- 60% of vaccinated animals will solve the infection

Variability in large population



Vaccination fails

Failure might be explained by some factors:

- Size of the wild boar population (variability)
- Presence of long virus shedders (chronic or immunotollerant animals)
- Stochastic variations of both infection and management parameters (recovery, latency, beta and passive immunity, hunting and vaccination)

The optimal vaccination

- Starts at 150 days after virus detection
- Immunise at least 40% of susceptible individuals during the first trial of vaccination
- Hunting should not exceed 45% of the whole population (excluded <4 months age class)

Offical infected area definition (wild boars)

- **Infected Area**: the area in which the infected wild boar population lives in continuity regarding its spatial distribution Can be very huge in the absence of any natural or artificial barriers (large rivers: Danube; highways etc.)
- **Sampling area**: the area in which the infected wild boar population lives in a homogeneous mixing that in the European ecological conditions is not less than 200-300 Km2 (10 km radius)

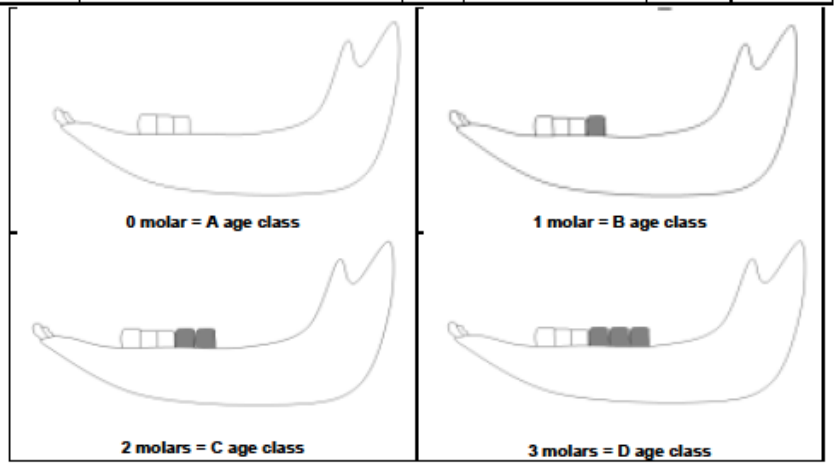
WILD BOAR SAMPLING Form N. _____

MUNICIPALITY_____ LOCALITY_____

HUNTING GROUD_____SAMPLE COLLECTED BY_____

DATE: _____

	N. LAB	SAMPLE INFORMATION	SEX		SAMPLED MATERIAL	
1		Found dead.....☐ Shot healthy.....☐ Shot with symptoms/lesions .....☐ AGE CLASS (see teeth eruption) A☐ B☐ C☐ D☐	M ☐		Blood ☐	Spleen ☐
			F ☐	Pregnant ☐ N. foetus _____		
2		Found dead.....☐ Shot healthy.....☐ Shot because of clinical signs.....☐ AGE CLASS (see teeth eruption) A☐ B☐ C☐ D☐	M ☐		Blood ☐	Spleen ☐
			F ☐	Pregnant ☐ N.foetus:_____		
3		Found dead.....☐ Shot healthy.....☐ Shot because of clinical signs.....☐ AGE CLASS (see teeth eruption) A☐ B☐ C☐ D☐	M ☐		Blood ☐	Spleen ☐
			F ☐	Pregnant ☐ N.foetus:_____		



Form to accompany blood and spleen for laboratory testing

Thanks