

BLUETONGUE

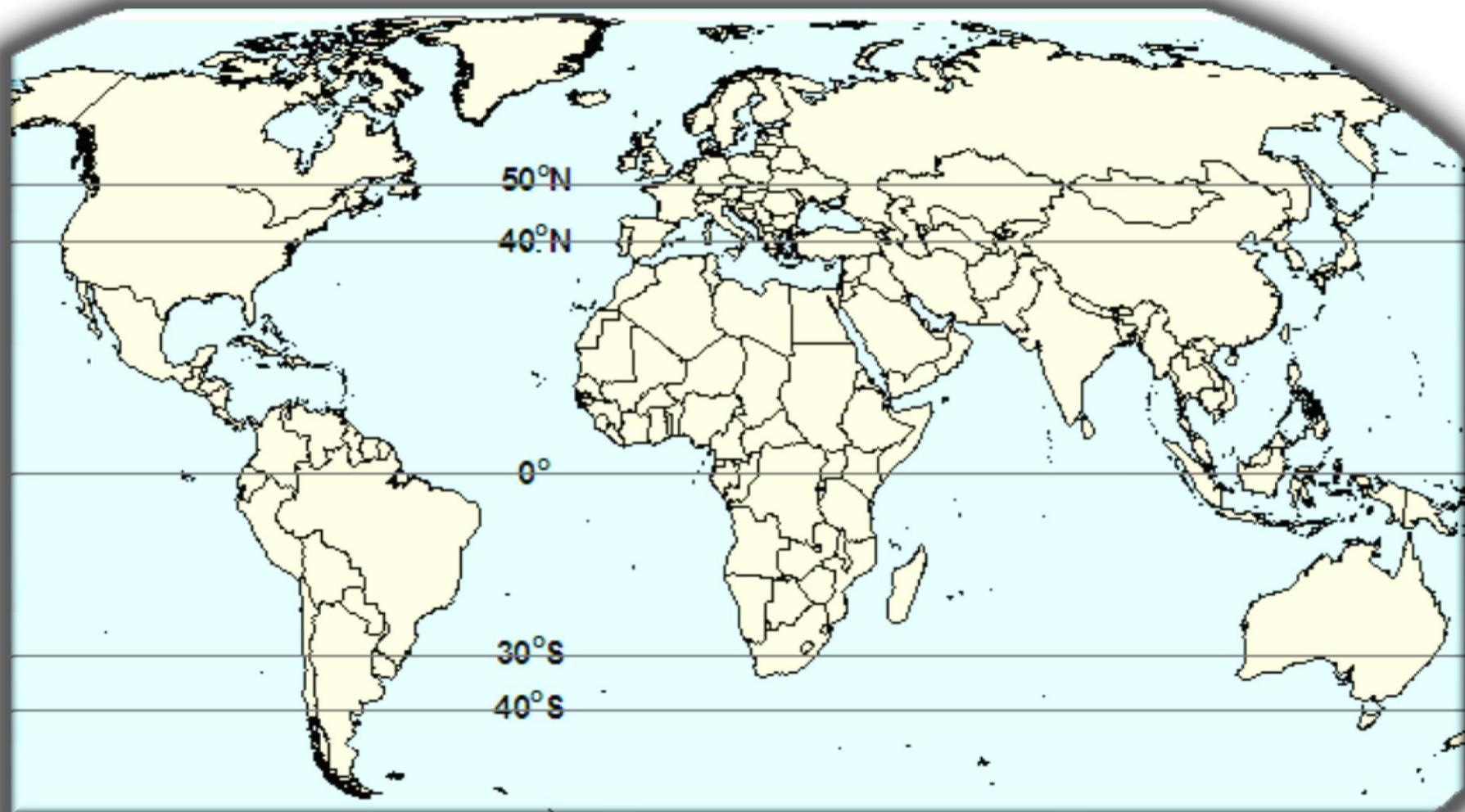


Marco Martini
Dipartimento di Medicina Animale, Produzioni e Salute
Università degli Studi di Padova, Italy



BLUETONGUE: background

- Malattia infettiva virale non contagiosa dei ruminanti
- Trasmessa da vettori (*Culicoides* spp.)
- 26 sierotipi di BTV: 24 classici + 2 scoperti recentemente in Svizzera (2008), Kuwait (2010)
- Sottoposta a notifica a World Organization for Animal Health (OIE) a causa della sua rilevanza socio-economica e commerciale
- Distribuzione della BT sino al 1999 fra 40°–50° latitudine N e 35° latitudine S; imponente ampliamento recente
- Presente in Italia dal 2000



BLUE TONGUE – storia

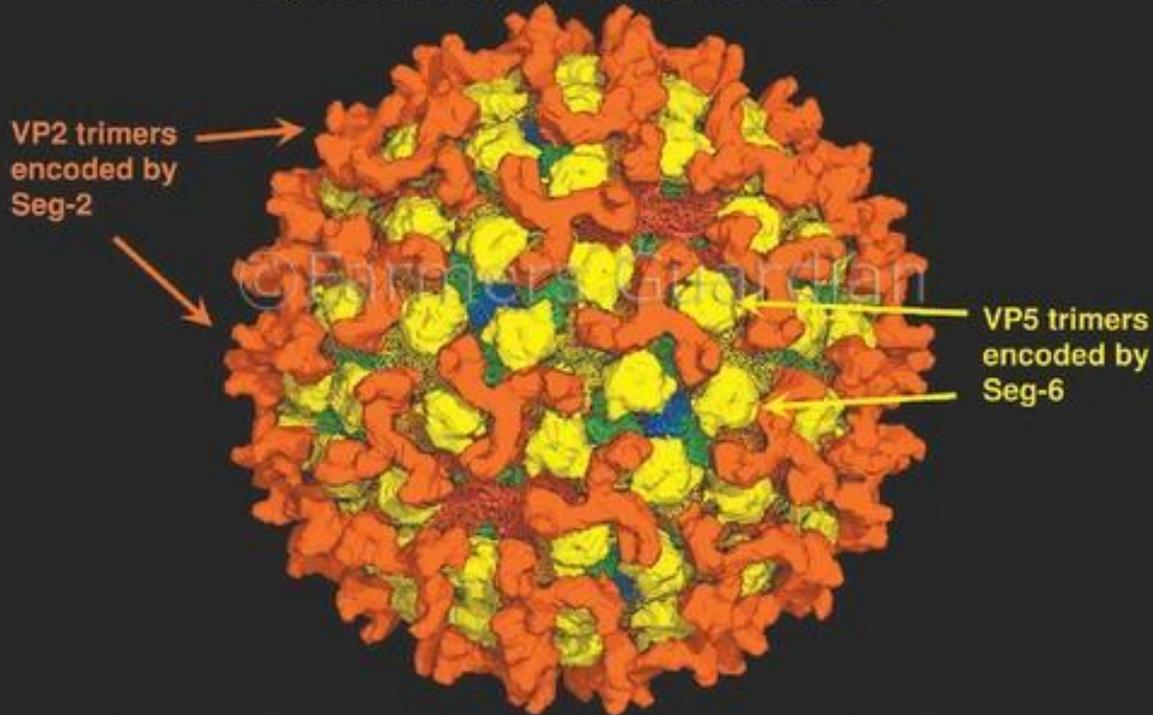
- ◊ L'infezione è presente da tempi storici in forma inapparente in ruminanti selvatici in Africa. Si è manifestata come grave malattia in pecore Merino importate in Sud Africa alla fine del 1700
- ◊ Agli inizi del 1900 viene riconosciuta la natura filtrabile (virale) dell'agente eziologico e successivamente (Theiler) viene messo a punto un vaccino attenuato
- ◊ Nel 1943 viene descritto il primo focolaio extra-africano a Cipro
- ◊ Nel 1943 (Du Toit) viene accertata la trasmissione tramite insetti vettori del genere *Culicoides*
- ◊ Nel 1948 viene confermata l'esistenza di diversi sierotipi

BLUE TONGUE – storia

- ◇ Anni '40 – '50: coltivazione del virus su embrione di pollo, cervello di topo, su colture cellulari
- ◇ Anni '70: descrizione e classificazione del virus
- ◇ Anni '80 – '90: sequenziamento genoma
- ◇ Progressivo allargamento distribuzione geografica

BLUETONGUE: l'agente

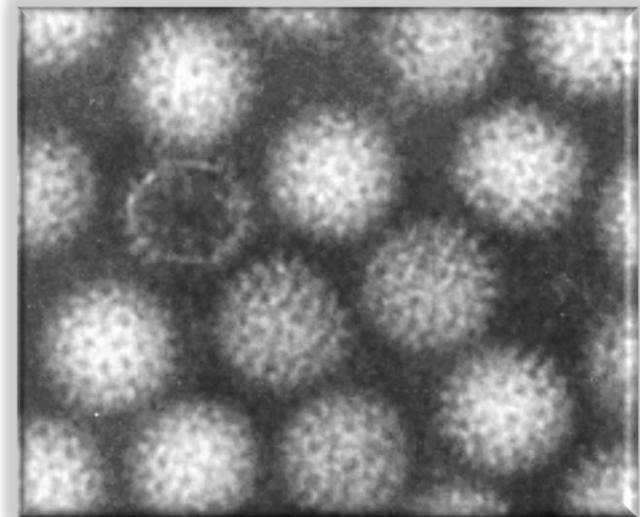
The outer surface of the BTV virus particle
VP and VP5 - Encoded by segments 2 and 6
(Cryo-EM and x-ray crystallography reconstruction)



BTV: virus nudo

Genoma: 10 segmenti distinti di dsRNA

Genere Orbivirus; Famiglia Reoviridae



BLUETONGUE: l'agente

Proteina	Segmento genomico	Localizzazione
VP1	1	core
VP2	2	capside esterno
VP3	3	core
VP4	4	core
VP5	6	capside esterno
VP6	9	core
VP7	7	core
NS1	5	cellula infetta
NS2	8	cellula infetta
NS3	10	cellula infetta

BLUETONGUE: l'agente

VP2 induce Ab tipo-specifici, ed è responsabile insieme a VP5 della capacità del virione di infettare le cellule

VP7 induce Ab gruppo-specifici

Le NS intervengono nell'assemblaggio del virione

BT in UE

- Fino al 1998 l'UE è stata BT-free
- Nel 1998 BT è comparsa in Grecia, nel 1999 in Bulgaria e dal 2000 in diversi altri Stati Membri mediterranei (F, IT, PT, ES)
- Nel 2006 BT è comparsa in Stati Membri settentrionali
- Dal 1998 BT è stata permanentemente presente in UE
- Sei sierotipi (1, 2, 4, 8, 9, 16) di BTV sono entrati in UE dal 1998; un nuovo sierotipo (25) è stato identificato in Svizzera

BLUETONGUE: epidemiologia

REGIONE	SIEROTIPO	VETTORE
AFRICA	1-16, 18, 19, 24	<i>C. imicola</i> , <i>C. bolitinos</i>
ASIA	1-4, 7, 9, 10, 12, 16, 17, 20, 21, 23, 26	<i>C. imicola</i> , <i>C. schultze grp.</i> , <i>C. fulvus</i> , <i>C. actoni</i> , <i>C.</i> <i>actoni</i> , <i>C. brevitarsis</i> , <i>C.</i> <i>orientalis</i>
AUSTRALIA	1, 3, 9, 15, 16, 20, 21, 23	<i>C. fulvus</i> , <i>C. wadai</i> , <i>C.</i> <i>actoni</i> , <i>C. brevitarsis</i>
EUROPA	1, 2, 4, 8, 9, 10, 16, 25	<i>C. imicola sensu stricto</i> , <i>C.</i> <i>obsoletus</i> , <i>C. pulicaris</i> , <i>C.</i> <i>dewulfi</i> , <i>C. chiopterus</i>
NORD AMERICA	2, 10, 11, 13, 17	<i>C. sonorensis</i> , <i>C. insignis</i>
CENTRO-SUD AMERICA, CARAIBI	1, 3, 4, 6, 8, 12, 17	<i>C. insignis</i>

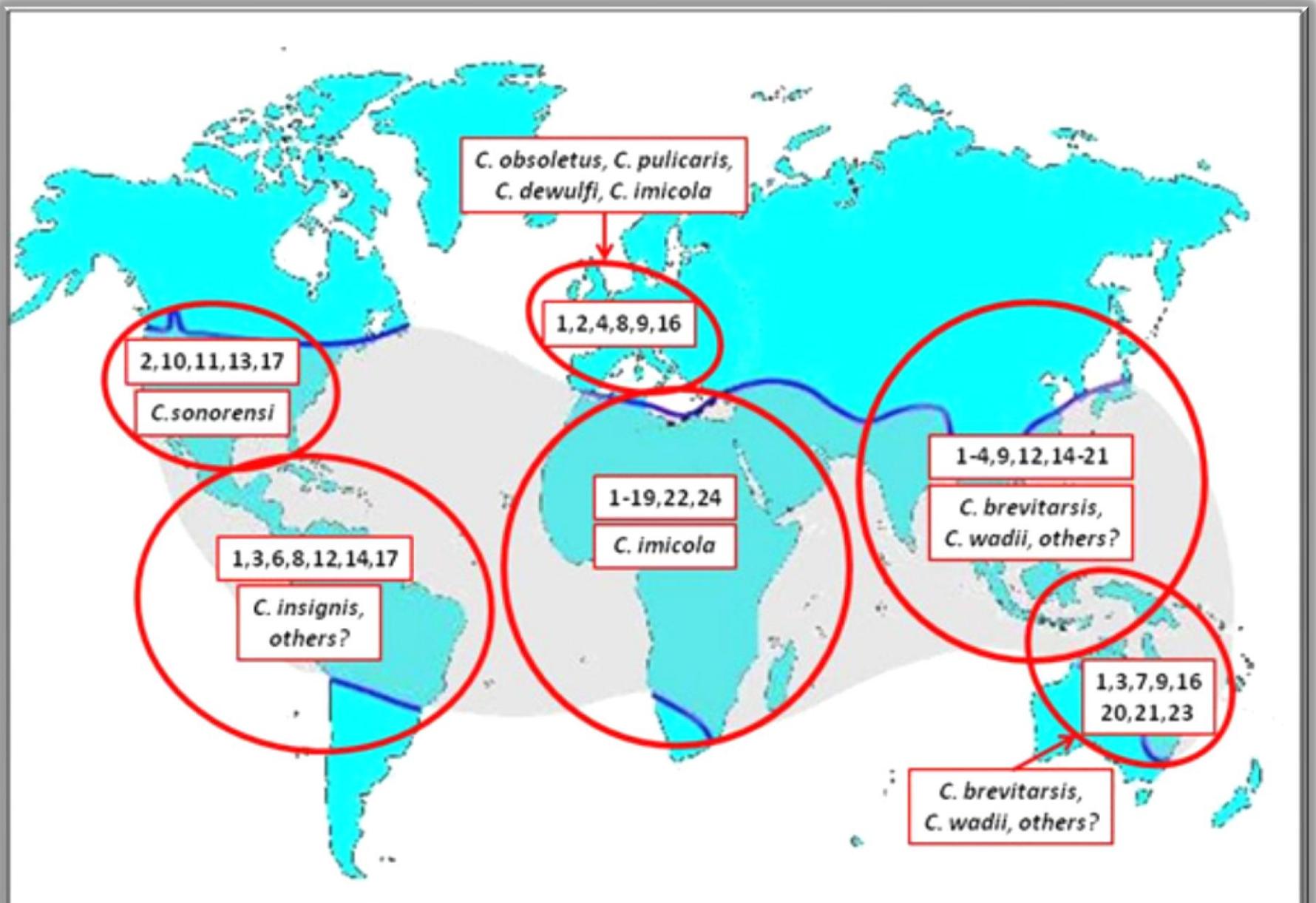


Fig. 2: Global distribution of serotypes of Bluetongue virus and *Culicoides* spp. of the geographic areas. Source: Adapted from Tabachnick (2010). *J Exp Biol*, 213: 946-954..

BLUETONGUE: epidemiologia

L'intensità della trasmissione virale dipende da:

- densità dei vettori ($T \rightarrow N^\circ$ di generazioni, habitat) e loro efficienza
- età dei vettori: solo le femmine adulte hanno un ruolo epidemiologico
- Competenza di specie/varietà: es. in Australia 26780 *C. brevitarsis* equivalgono in efficacia a 173 *C. fulvus*
- N° pasti di sangue
- N° virioni nel pasto di sangue

The longer the viraemia, the smaller the number of vectors per host that is necessary to obtain a $R_0 > 1$ ($R_0 >$ indicates that the disease would be expected to spread in a susceptible population) (Figure 2).

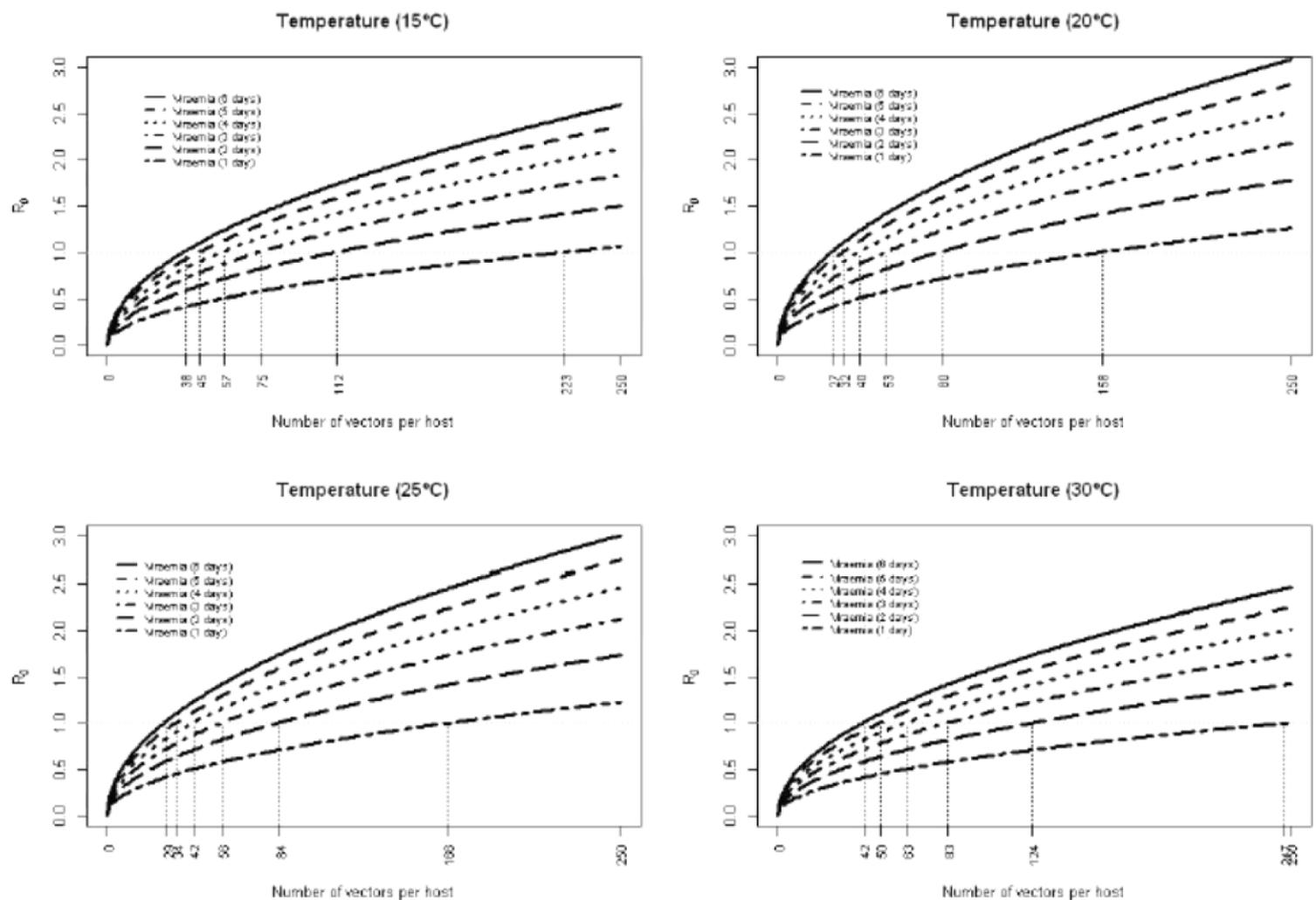


Figure 2: Estimation of the basic reproduction number (R_0), based on different temperatures, number of vectors per host and duration of the viraemia. The X-axis displays the numbers of vectors per host that are needed for $R_0 > 1$ (disease will spread in a susceptible population) for different viraemia durations.

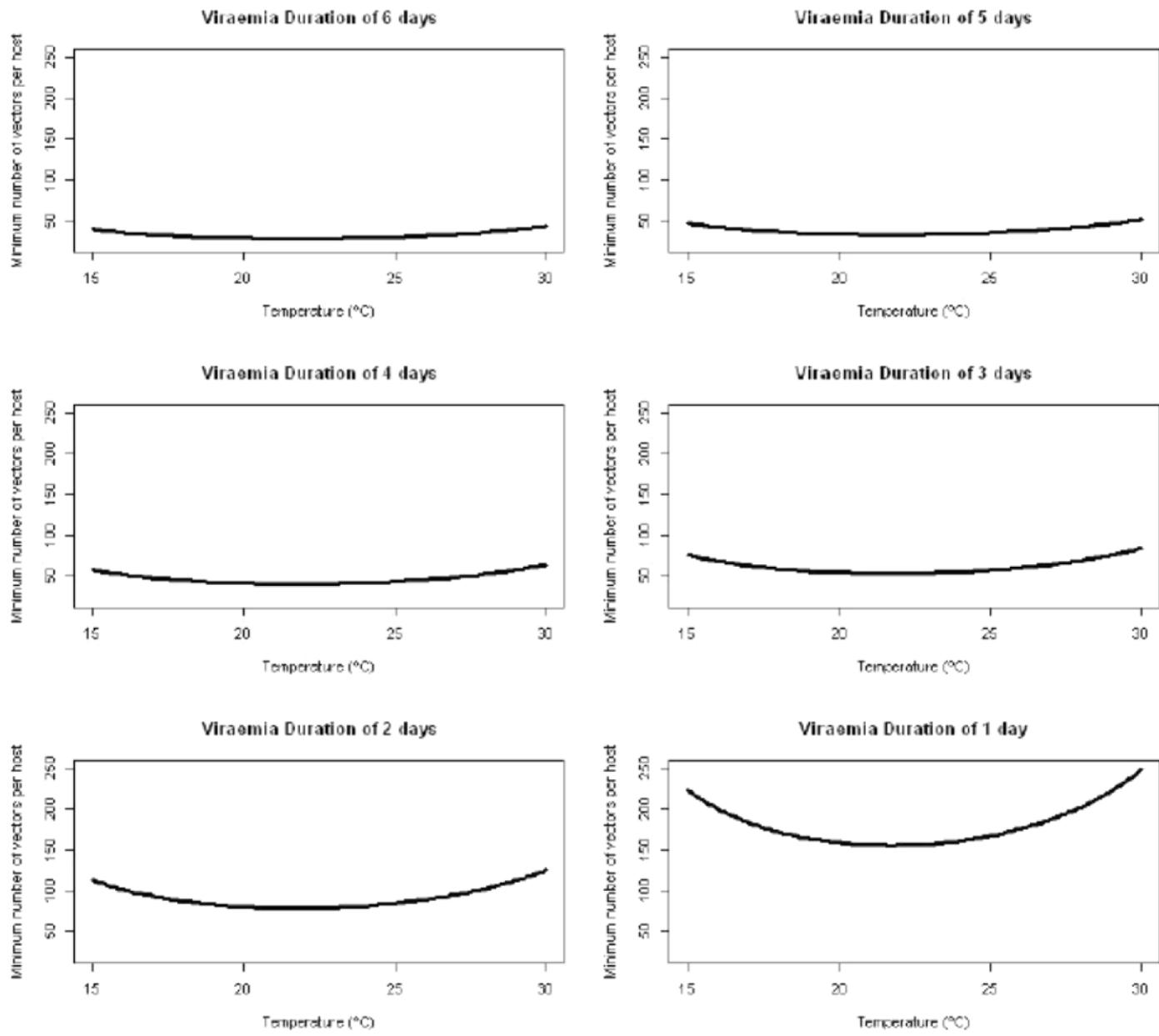


Figure 3: Relationship between temperature and minimum number of vectors per host needed to have $R_0 > 1$ for different viraemia durations.

BLUETONGUE: epidemiologia - vettori

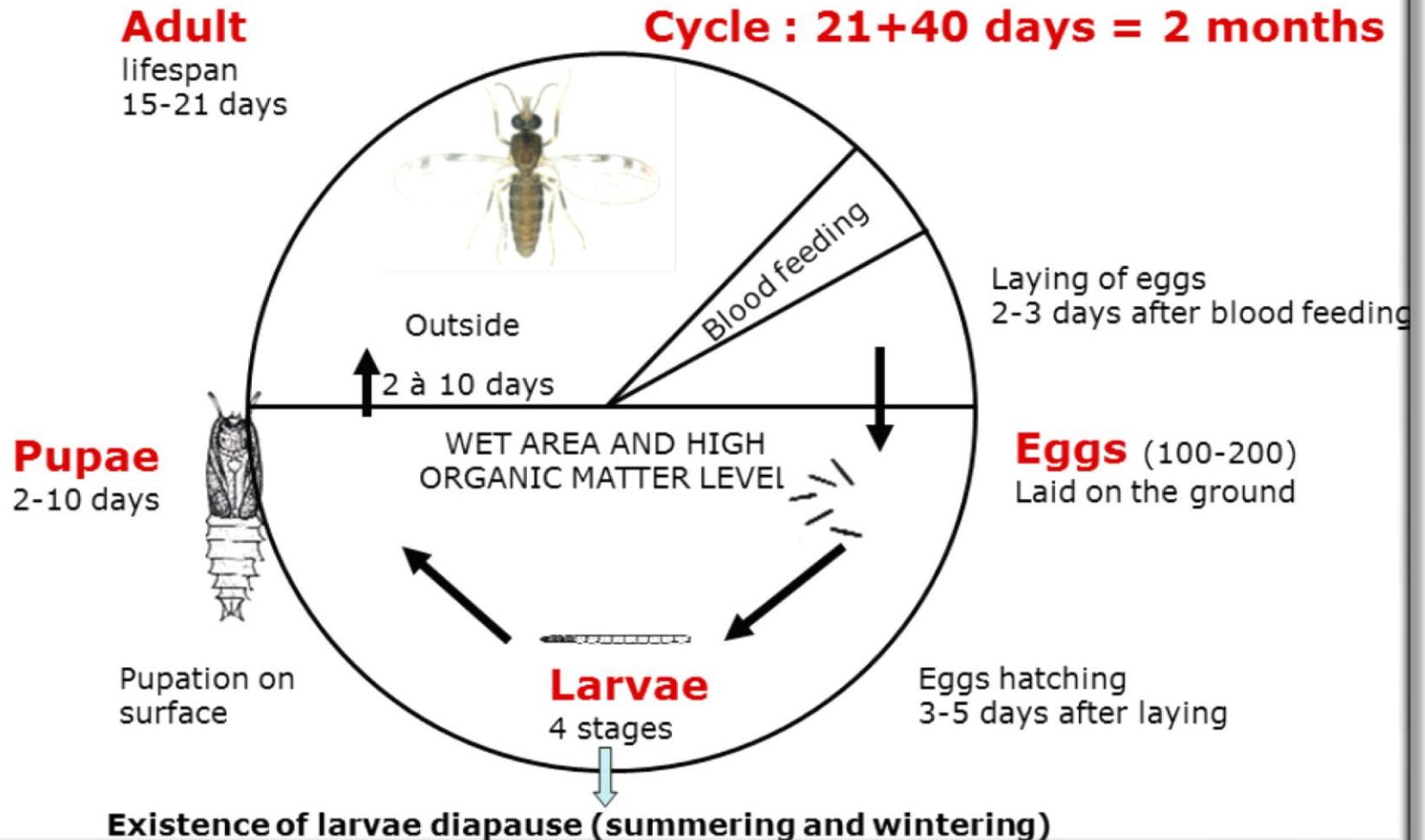
Pasto di sangue (fino a 10 nel corso della vita di *C. imicola*) → uova (± 100 *C. imicola*) → maturazione (2 – 4 gg., a seconda di T°) → larve e pupe (habitat: limite terreno-acqua; feci di erbivori; cavità di piante o rocce; vegetali in decomposizione)

L'intero ciclo uovo – uovo non dura meno di 25 gg, è più breve a temperature elevate. In annate calde si possono avere più di 10 generazioni

La durata della vita di un adulto è intorno ai 20 gg in estate ed è inversamente proporzionale alla T° (eccezionalmente può arrivare sino a 90 gg)

> 12 °C → forte riduzione della densità

Life cycle of *Culicoides imicola*



BLUETONGUE: epidemiologia-vettori

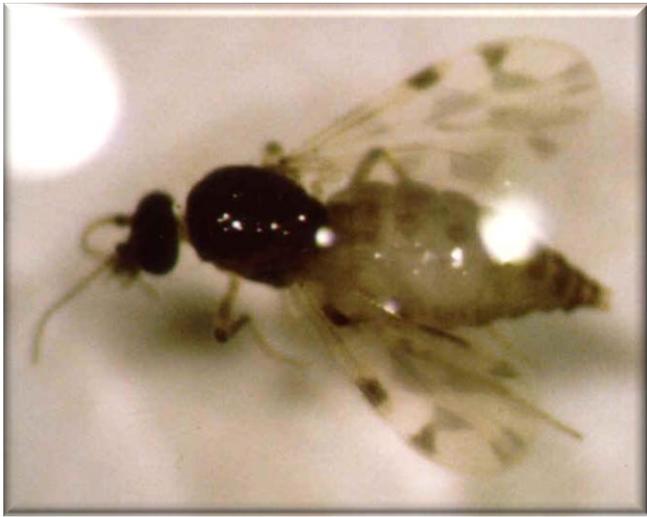
Basse t° non uccidono i *Culicoides* a nessuno stadio:

- Uova di *C. imicola*: 2 mesi a t° < 6°C
- Larve: 2 mesi a t° < 6°C
- Adulti: 2 settimane a –1,5°C (diapausa) – sopravvivenza del 15%

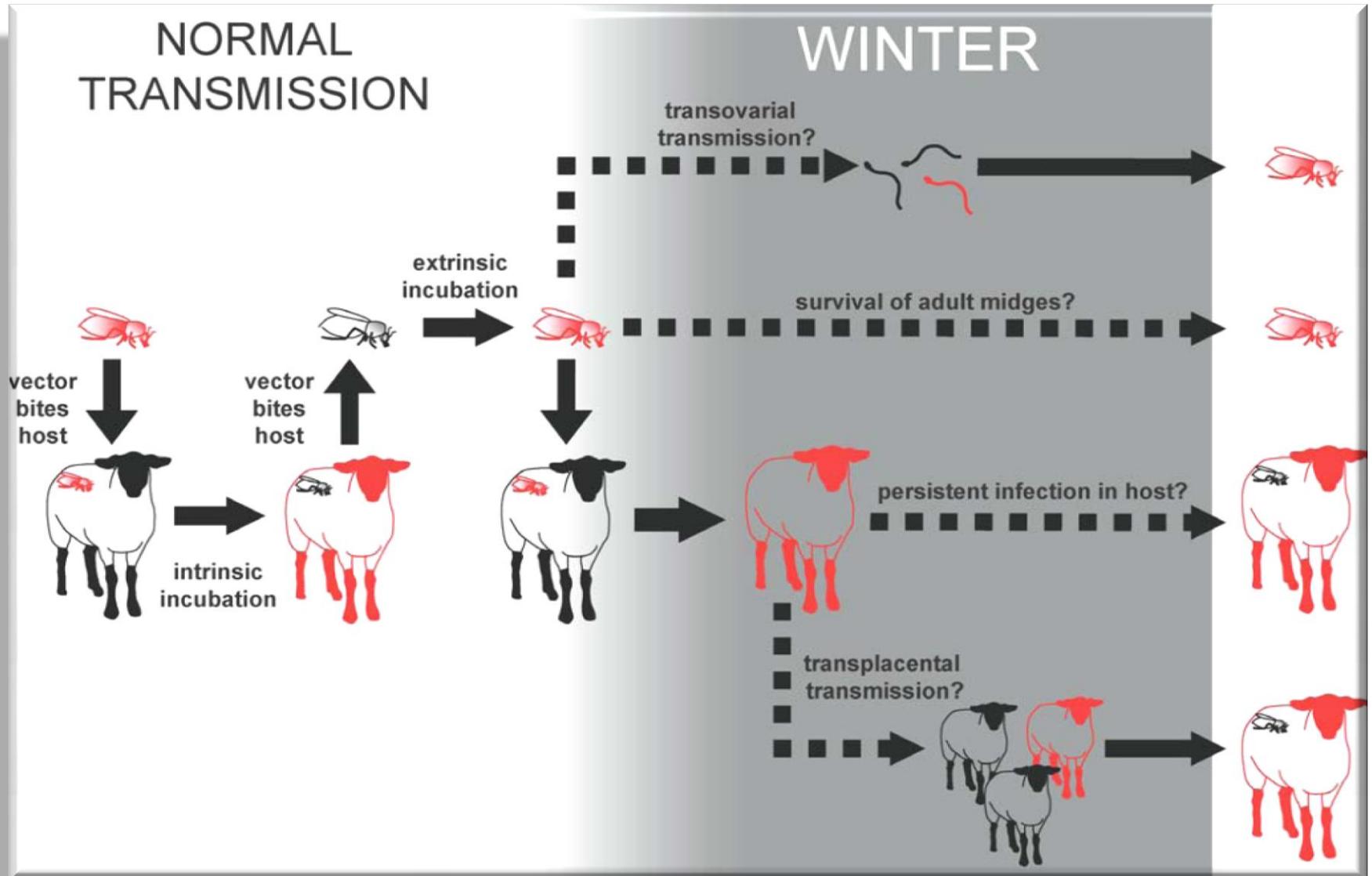
BLUETONGUE: epidemiologia-vettori

C. Imicola:

- attivo nelle ore notturne
- range: fino a 2 – 4 km. Possono però essere trasportati a grandi distanze da correnti aeree
- predilige stare all'aperto, non entra in stalla
- si alimenta preferenzialmente sul bovino



BLUETONGUE: epidemiologia – permanenza nelle zone a clima temperato



BLUETONGUE:

meccanismi di overwintering proposti

- circolazione ridotta (improbabile: non si registrano casi in inverno)
- trasmissione transovarica nel vettore (mai dimostrata)
- infezione persistente nei ruminanti (probabile, descritta)
- trasmissione transplacentare (probabile, descritta in bovini per BTV8 in UK e IRL)

BLUETONGUE: epidemiologia

Per l'O. I. E. Animal Health Code, la durata dell'infettività degli animali infetti è di 60 giorni

I bovini hanno un ruolo importante come ospiti primari, amplificatori e fonte di infezione per i vettori

Viraemia and serum BTV-specific antibody detection in BTV experimentally infected North American and European wild ruminants.

Species	Viraemia duration	Viraemia onset	Viraemia analytical methods	1st antibodies	Antibody duration	Reference
Black-tailed deer (<i>Odocoileus hemionus columbianus</i>)	NA	NA	NA	From 9 to 12 dpi	Over 692 dpi	Patton et al. (1994)
Black-tailed deer (<i>Odocoileus hemionus columbianus</i>)	From 1 to 10 days	From 2 to 9 dpi; peak at 7 dpi	Virus isolation	From 6 to 13 dpi	Over 692 dpi	Work et al. (1992)
White-tailed deer (<i>Odocoileus virginianus</i>)	3 days (2–5 dpi)	2 dpi	Virus isolation	NA	NA	Hoff and Trainer (1974)
White-tailed deer (<i>Odocoileus virginianus</i>)	From 1 to 8 days	From 2 to 7 dpi	Virus isolation	NA	NA	Vosdingh et al. (1968)
American bison (<i>Bison bison</i>)	From 1 to 4 days	From 4 to 7 dpi; 1 up to 28 dpi	Virus isolation	From 11 to 28 dpi	Over 127 dpi	Tessaro and Clavijo (2001)
European red deer (<i>Cervus elaphus</i>)	Over 112 days	From 1 to 112 dpi	Virus isolation and RNA detection (only 12 DPI)	From 1 to 7 dpi	Over 112 dpi	López-Olvera et al. (2010)
North American elk (<i>Cervus elaphus canadensis</i>)	From 3 to 8 days (2 days) ^a	From 2 to 10 dpi (106 dpi) ^a	Virus isolation	From 2 to 5 dpi	>7 week dpi	Murray and Trainer (1970)

BLUE TONGUE – epidemiologia

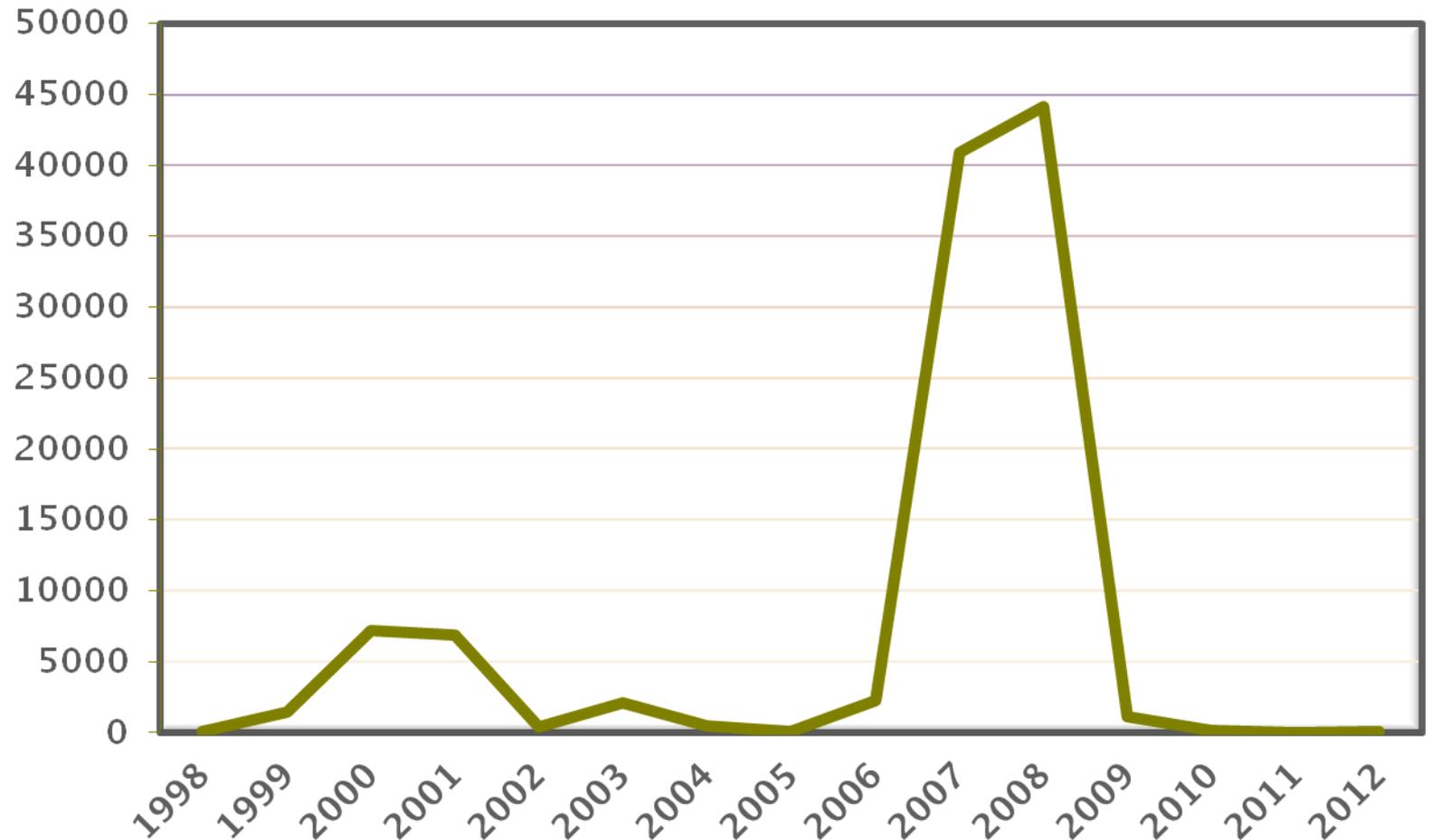
La presenza della malattia in Italia viene accertata nell'agosto 2000 in Sardegna (sierotipo 2, presente in Nord-Africa). In ottobre i focolai erano già 2235.

Contemporaneamente la malattia viene segnalata anche in Calabria (184 focolai in novembre; sierotipi 2 e 9, presenti in Grecia e M. O.) e Sicilia (11 focolai in dicembre; sierotipi 2 e 9).

Successiva espansione verso Nord, fino a interessare Puglia, Basilicata, Campania, Lazio, Toscana

Nel 2002 compaiono anche i sierotipi 4 e 16

Trend of BT outbreaks in the EU (1998 – 2012)



*al 05.11.2012

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AT											11	12		
BE									695	6661	45	2		
BG									13					
CZ										1	9	4		
CY							1						6	9
DK										1	15			
FR			49	335		16	21	6	6	5608	38022	86	1	
DE									885	11487	2605	142		
GR	84	1478		172							78	191	36	10
HU											1			
IT			6857	6370	430	2070	136		236	2	5	67	37	13
LU									5	1315	19	2		
NL									456	5798	66	12		
PT									1	158	78	129	6	1
ES			339			14	317	87		6095	3036	427	88	6
UK										65	81			
SE											28	2		
CH											42	36	1	
EU	84	1478	7227	6895	430	2101	499	93	2297	40931	44141	1112*	175°	39

* + 4 FOCOLAI IN NORVEGIA; ° + 1 FOCOLAIO IN CROAZIA

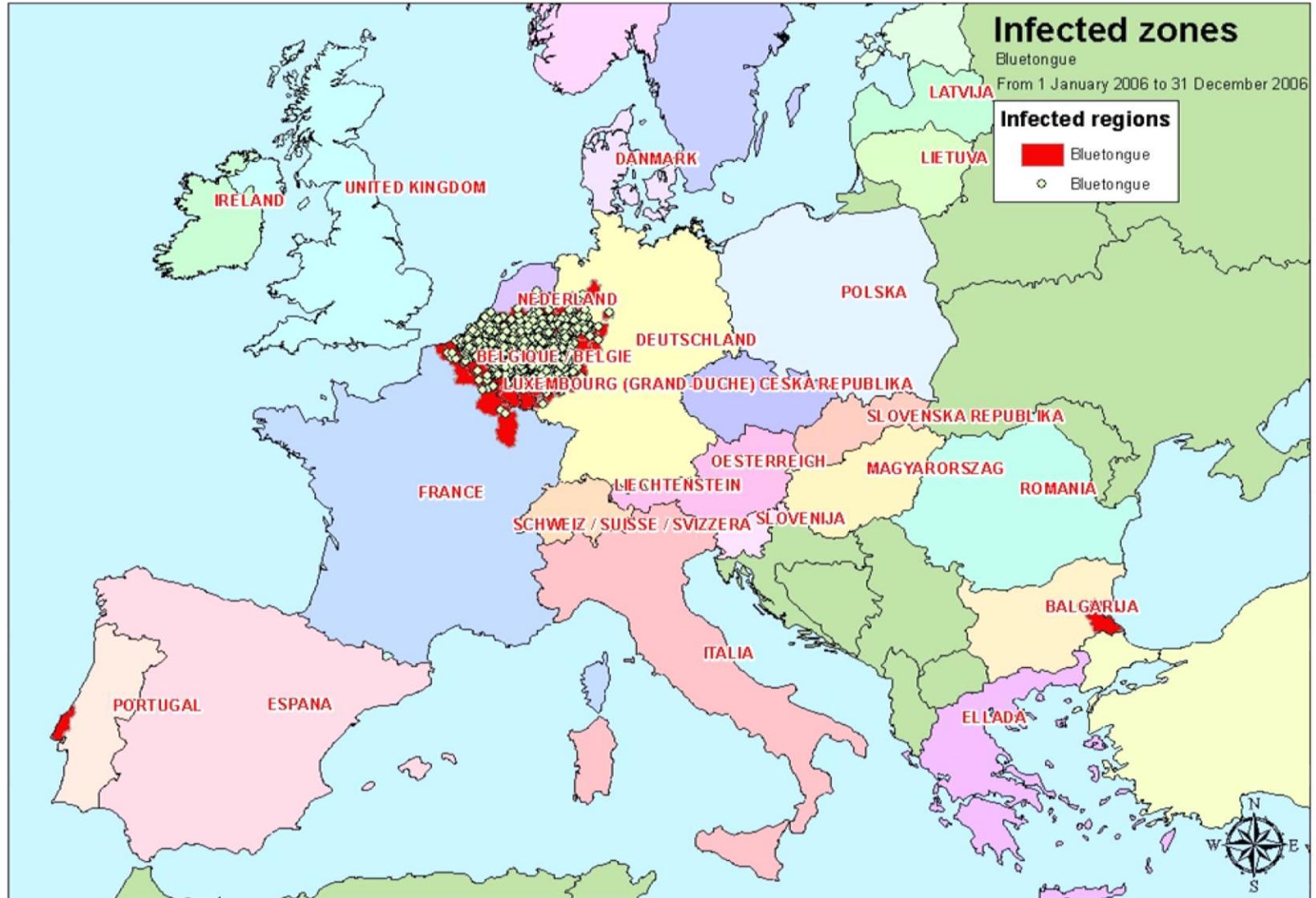
Focolai di Bluetongue in EU nel 2012

B.T.	GREECE	18.12.2012	90
	ITALY	29.12.2012	232
	PORTUGAL	22.10.2012	3
	SPAIN	05.11.2012	7
		Total :	332

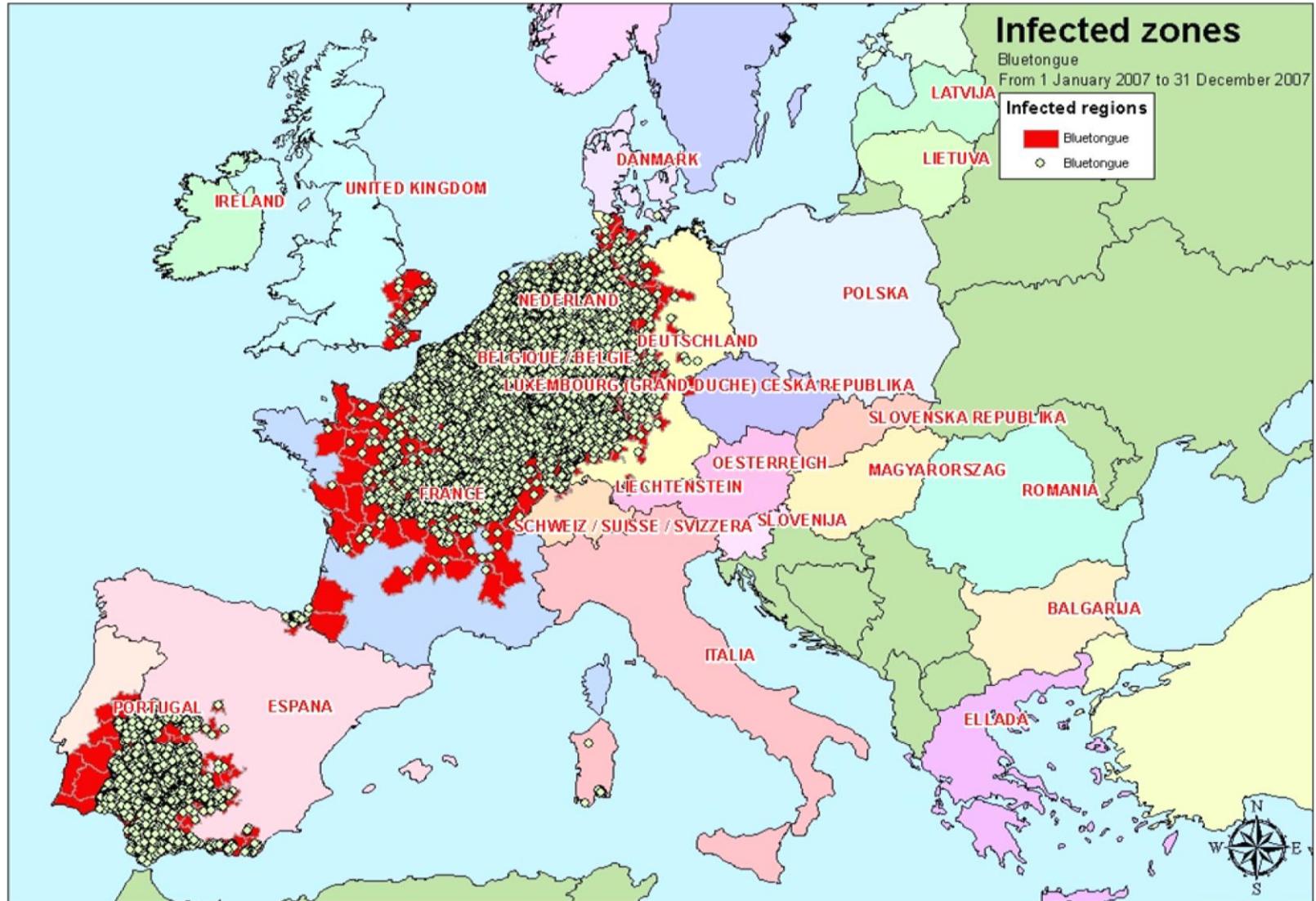
Focolai di Bluetongue in EU nel 2013 (al 14/10)

B.T.	FRANCE	11.09.2013	10
	ITALY	03.10.2013	3107
	SPAIN	22.03.2013	1
		Total :	3118

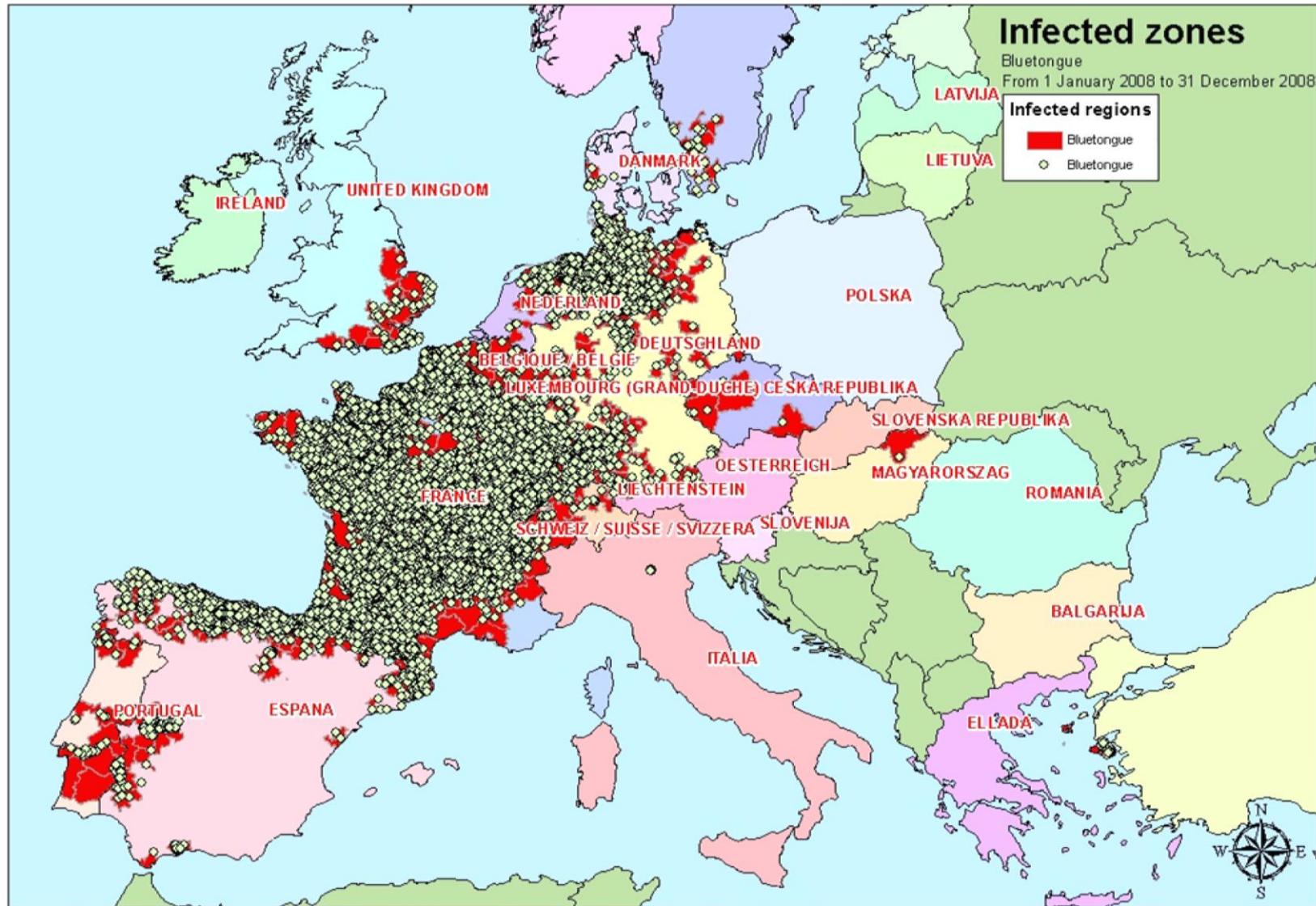
FOCOLAI di BLUETONGUE in EU NEL 2006



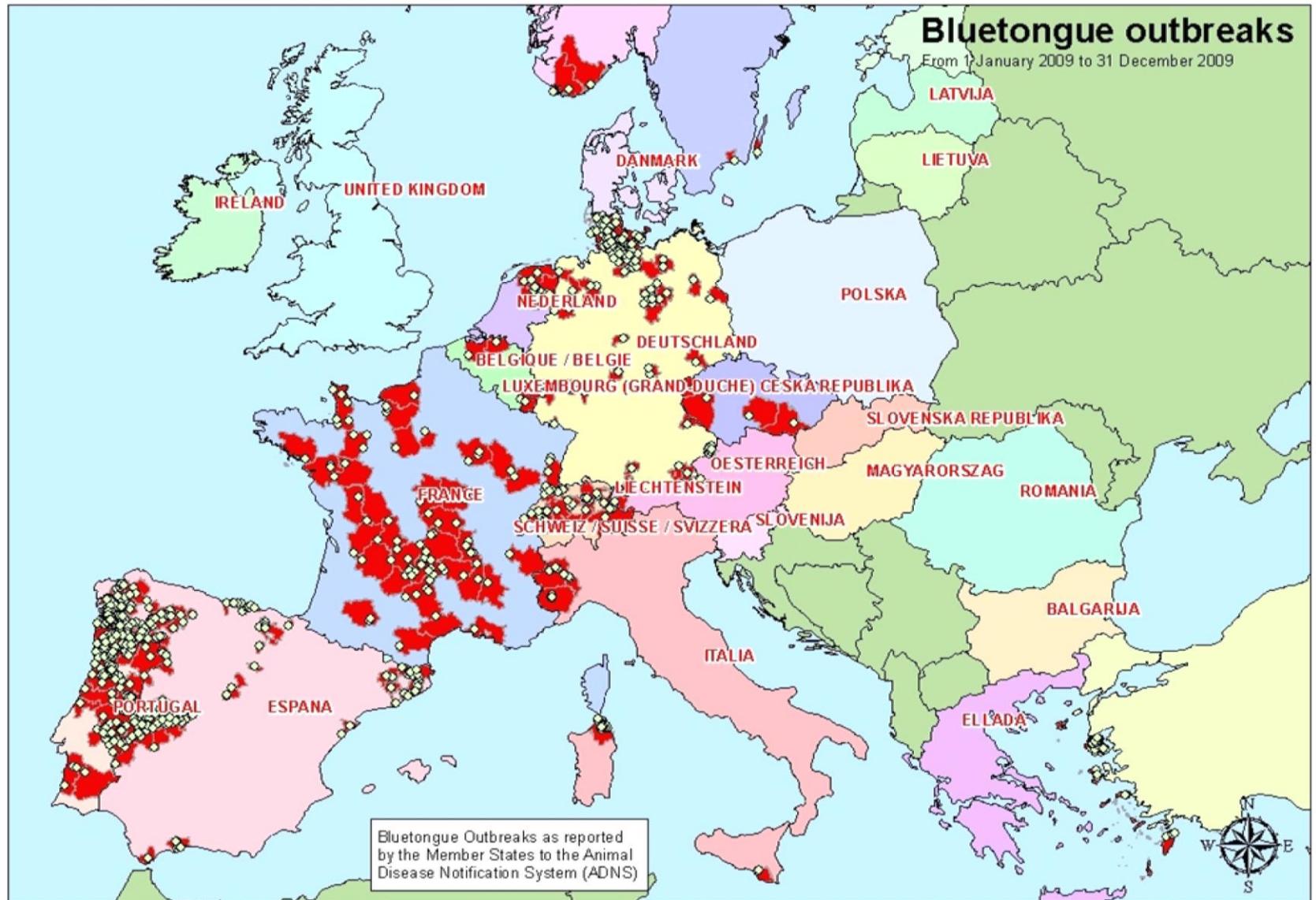
FOCOLAI di BLUETONGUE in EU NEL 2007



FOCOLAI di BLUETONGUE in EU NEL 2008



FOCOLAI di BLUETONGUE in EU NEL 2009



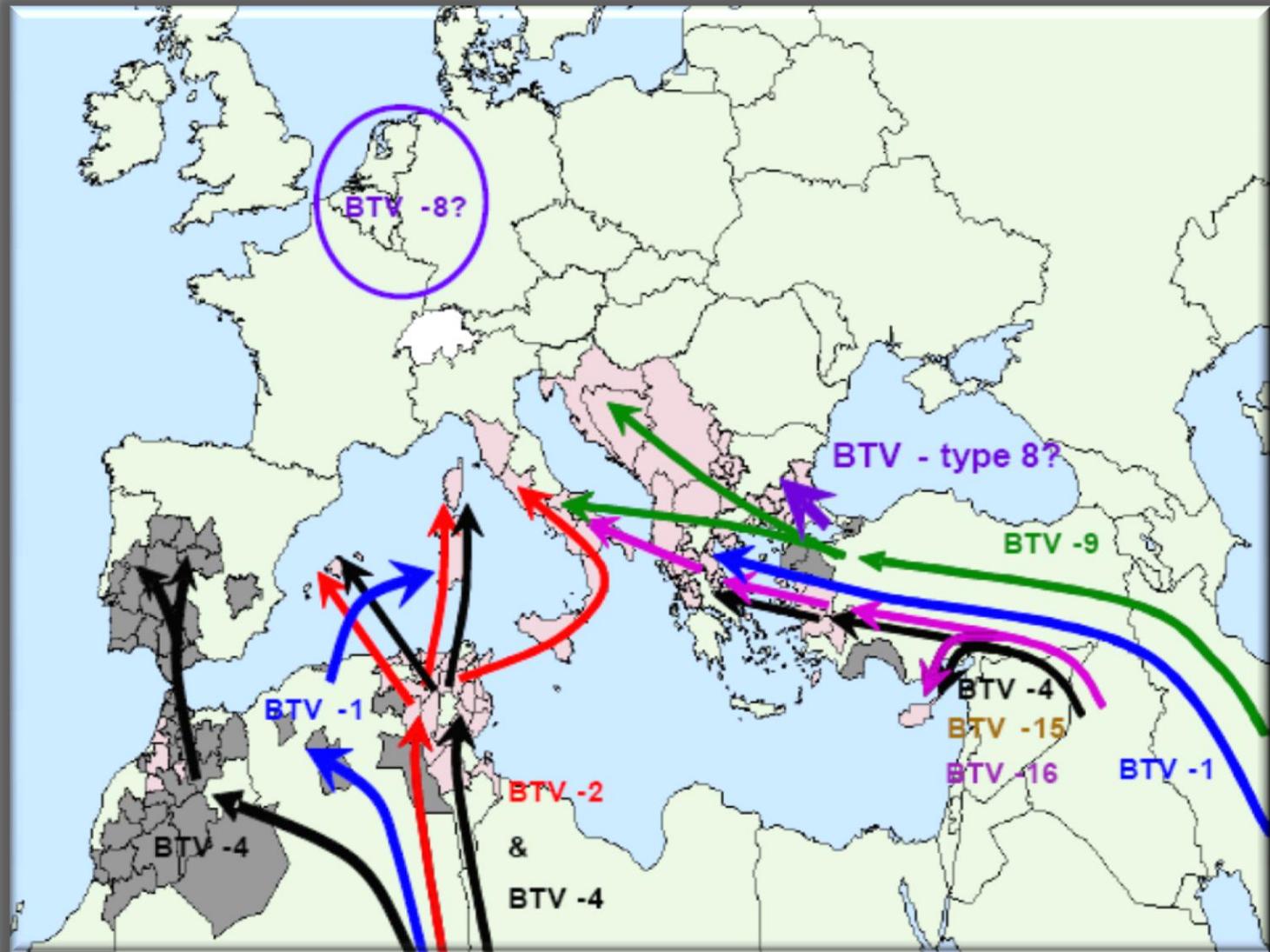
FOCOLAI di BLUETONGUE in EU NEL 2010



BT in the EU: EXPLANATIONS

- Linear extension of earlier eastern outbreaks (BTV1, BTV4 into Greece; BTV9 into Bulgaria, Greece, Italy; BTV16 into Cyprus, France, Greece, Italy)
- Northward spread from the eastern part of North Africa (BTV1 into Italy; BTV2, BTV4 into France, Italy and Spain)
- Northward spread from Morocco (BTV4 into Portugal and Spain)
- Northern EU **???** (BTV8 closely related to subsaharan African strains; first isolation in the area of Maastricht - NL)

Map of the possible routes of introduction of the different BTV serotypes in the EU since 1998

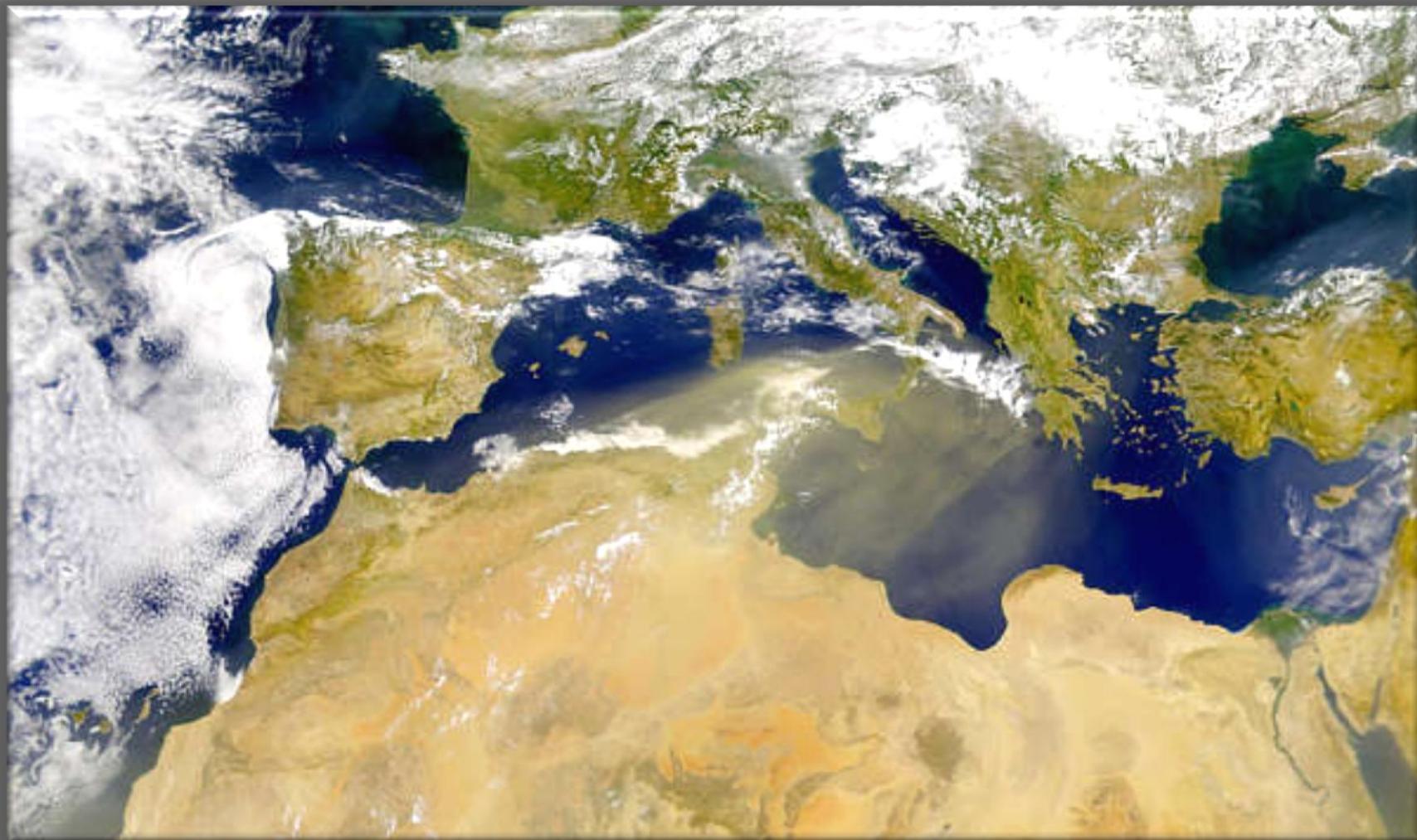


(P. Mertens (IAH), 2007)

BT in the EU: POSSIBLE WAYS OF INTRODUCTION

- **Domestic or wild ruminants**
- **Animal products (ova, semen, embryos)**
- **Infected vectors**
 - **through active flight**
 - **carried by**
 - **living (animals, plants) means**
 - **inanimate (ships, planes ...) means**
 - **through passive flight on the wind**

18 luglio 2000



18 luglio 2000



1 BT in the EU: hypotheses about the origin of the introduction of BTV8 into Northern Member States in August 2006

- **Imported infected ruminants**
 - **TRACES data were used. Some animal movements could not be traced back**
- **Imported infected animal products**
 - **only semen from BTV8 free Countries (USA and Italy) has been introduced**

2 BT in the EU: hypotheses about the origin of the introduction of BTV8 into Northern Member States in August 2006

- **Infected vectors introduced with horses**
 - **World Equestrian Games were held in August 2006 in Aachen (DE), very close to Maastricht**
- **Infected vectors introduced with exotic plants**
 - **Maastricht is a major EU hub for the importation of exotic plants from Africa and South America**

3 BT in the EU: hypotheses about the origin of the introduction of BTV8 into Northern Member States in August 2006

- **Contaminated or unstable vaccines**
 - **most of the vaccines are produced with bovine serum, not always inactivated by gamma radiation. A distemper vaccine was found contaminated with BTV**
 - **in Bulgaria a pentavalent MLV vaccine (BTV 3 8 9 10 11) imported from South Africa was used in 1999. Genome sequences indicate that this vaccine strain and the field strain are not related**
 - **Vaccine strains of new serotypes (BTV 6 in NL and DE; BTV 11 in BE; BTV 14 in PL, LT, LV, ET) have circulated in BE, NL and DE in 2008-2009 and in PL, LT, LV, ET in 2012**

BT in the EU: ECOLOGIC CHANGES

- BT has persisted in the EU for almost a decade, with multiple waves of distinct serotypes
- BT has advanced northwards to ever-higher latitudes, far beyond the northern *C. imicola* limit (45°)
- BT has recruited additional vectors (*C. dewulfi*, *C. chiopterus*), occurring as far north as the 60th parallel
- BT has adapted to new ecosystems

BT IN THE EU: RISK FACTORS OF PERSISTENCE NORTHERN MEMBER STATES

IN

- **Northern EU is not geographically limited**
- **Densely populated livestock areas**
- **Widely prevalent *Culicoides* spp vectors**
- **Increased warming in global climate**

BLUE TONGUE – patogenesi

Prima moltiplicazione virale nei linfonodi regionali

Ulteriore replicazione in altri linfonodi, nelle cellule endoteliali e periendoeliali dei capillari, venule e arteriole → necrosi, iperplasia rigenerativa → coagulazione intravasale → occlusione → stasi → ipossia, edemi, emorragie

Viremia (3 gg p.i.) associata a eritrociti e leucociti, solo piccole quantità di virus libero nel plasma. Scarsissima presenza del virus in secreti ed escreti

Panleucopenia come risultato di replicazione virale nei leucociti o nel sistema emopoietico

Lesioni alle fibre muscolari striate per effetto della replicazione virale

BLUE TONGUE – sintomatologia

Nella maggior parte delle specie l'infezione è asintomatica

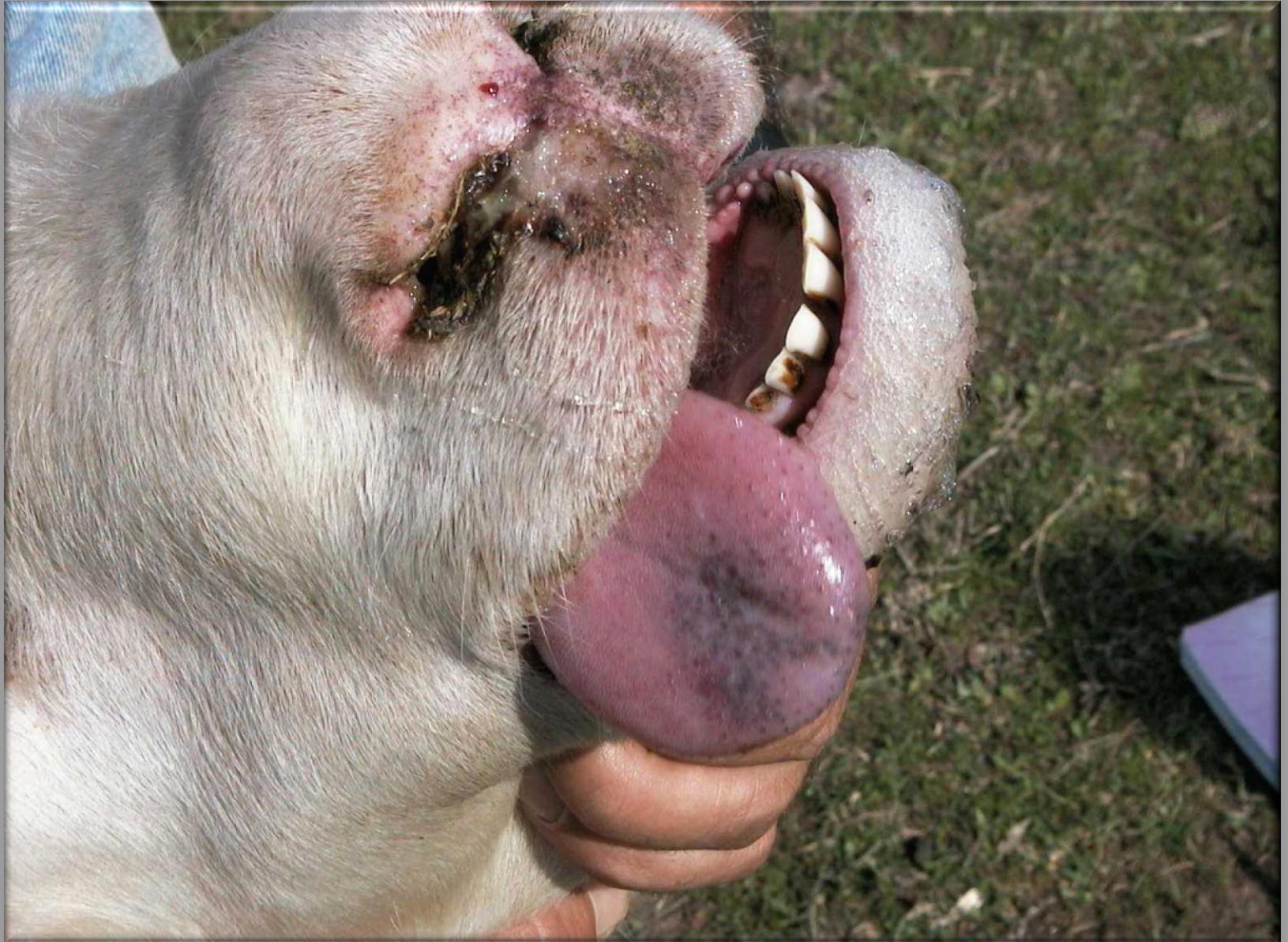
Nella PECORA (e in alcuni selvatici americani: *Antilocapra americana*; *Ovis canadensis*; *Odocoileus virginianus*) dà grave sintomatologia, anche con mortalità elevate, in dipendenza dalla razza colpita, dal sierotipo virale, dalle condizioni di allevamento, dall'esposizione solare

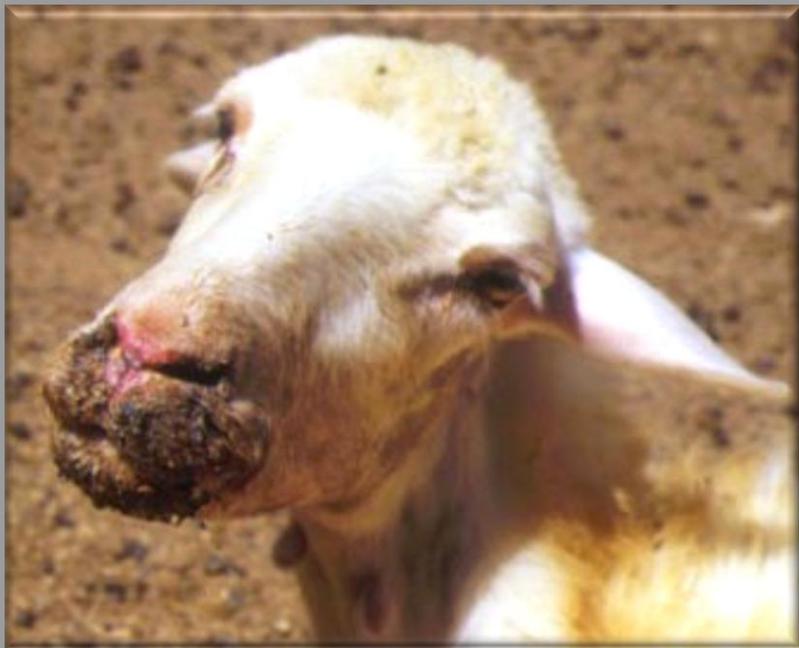
BLUE TONGUE – sintomatologia OVINO

- ✓ Incubazione: 4 – 14 gg (media 7)
- ✓ Febbre: durata 6 – 8 gg; anche 42 °C
- ✓ Edema e iperemia delle regioni orale, oculare, auricolare
- ✓ L'edema può estendersi alla regione sottomandibolare e al collo, causando difficoltà respiratorie
- ✓ La lingua edematosa e cianotica (→bluetongue) talvolta protrude
- ✓ Emorragie a lingua, labbra, musello

BLUE TONGUE – sintomatologia OVINO

- ✓ scolo nasale, prima sieroso, poi mucopurulento
- ✓ erosioni e necrosi a carico di bocca, musello
- ✓ striature emorragiche a livello dei cercini coronari
- ✓ iperemia cutanea → emorragie in caso di trauma
- ✓ edema, soprattutto a carico della testa
- ✓ torcicollo come esito di degenerazione muscolare
- ✓ stasi ruminale, diarrea emorragica
- ✓ aborto



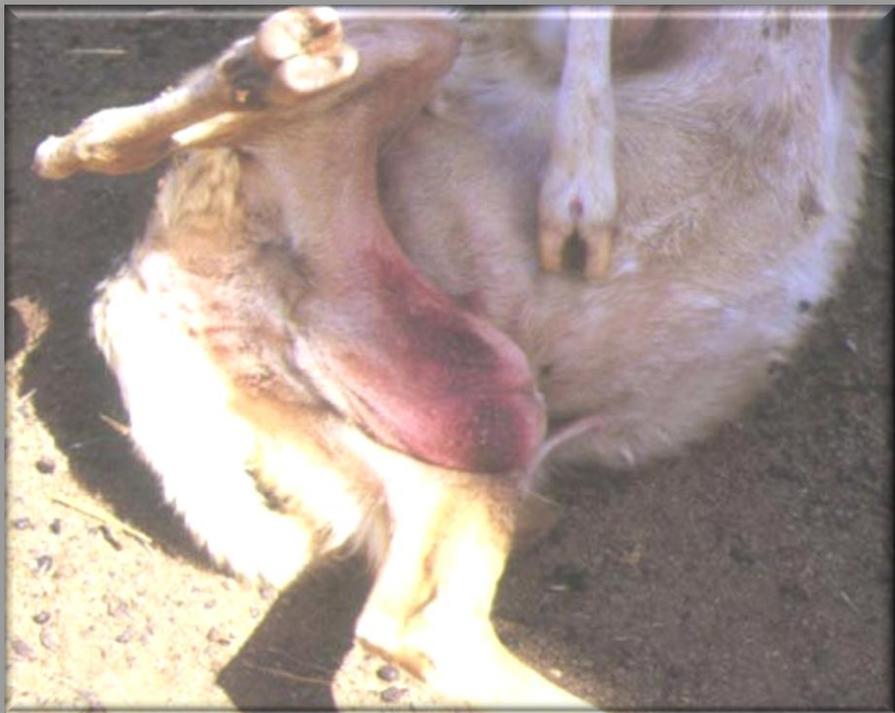








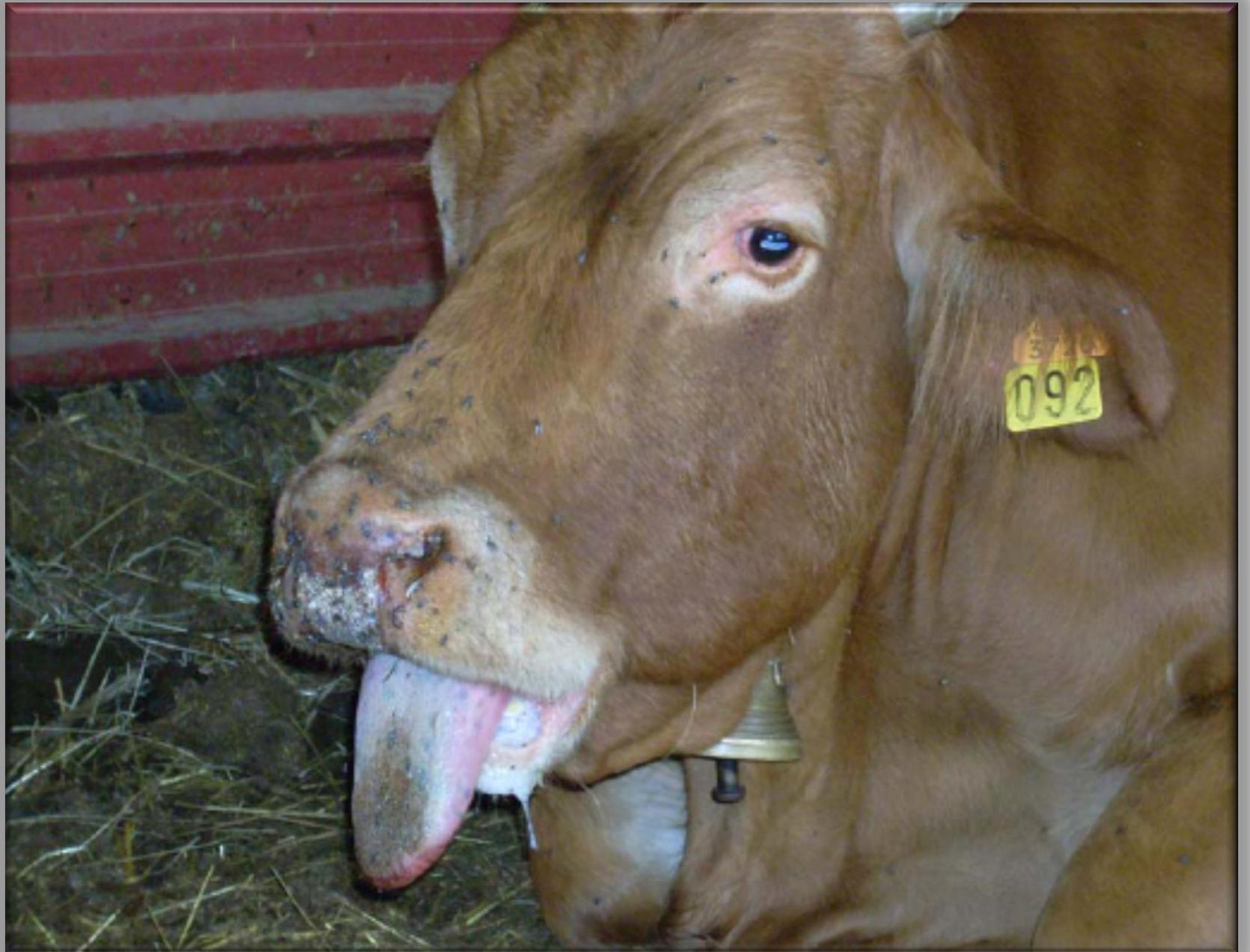














BLUE TONGUE – Lesioni

Iperemia, edema e emorragie diffuse o localizzate, come risultato del danno vascolare

Iperemia, edemi diffusi, petecchie nella mucosa nasale, faringea, tracheale e nei polmoni; liquido schiumoso negli alveoli e nell'albero bronchiale

Petecchie o emorragie più imponenti alla base dell'arteria polmonare (lesione patognomonica)

Iperemia, petecchie, ulcere nella mucosa dei prestomaci

Iperemia, emorragie intestinali

Emorragie peri- e endocardiche

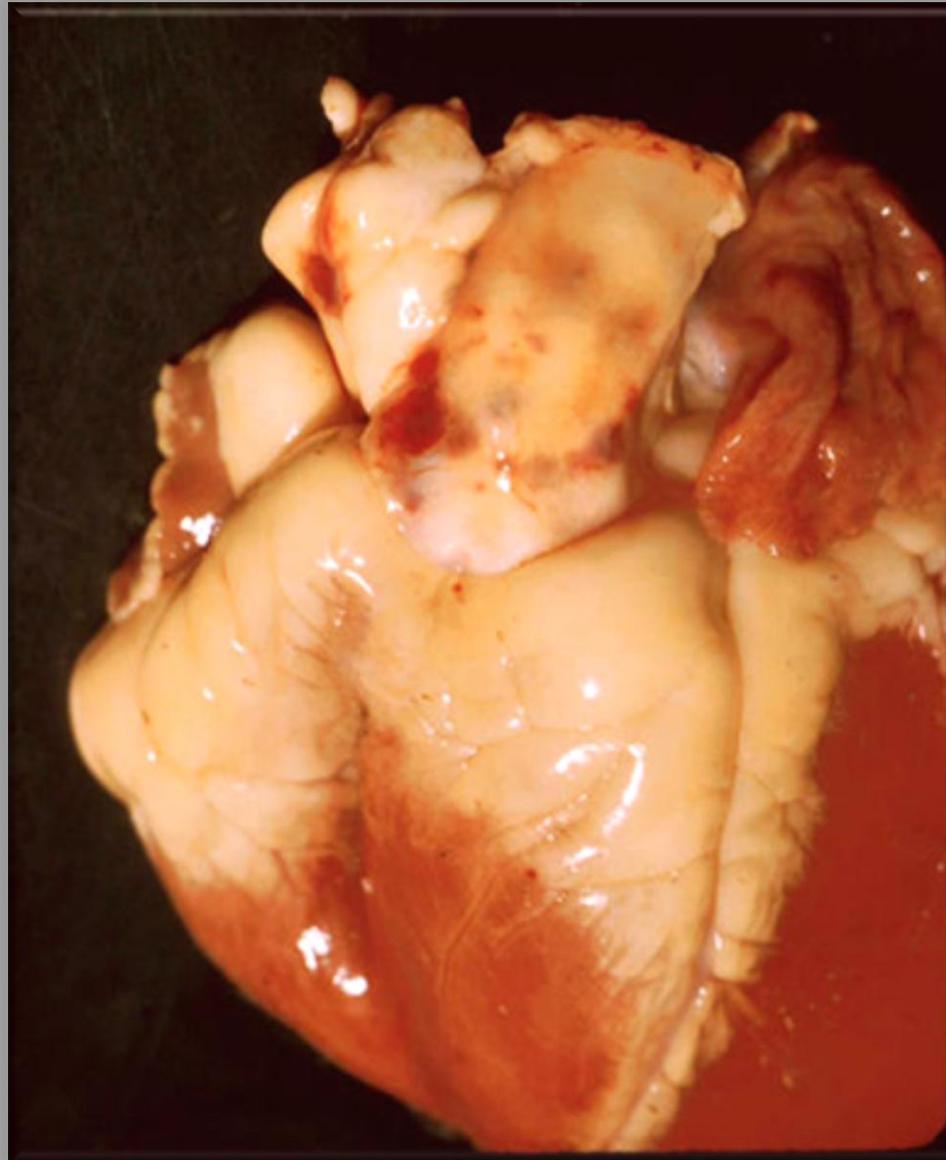
BLUE TONGUE – lesioni

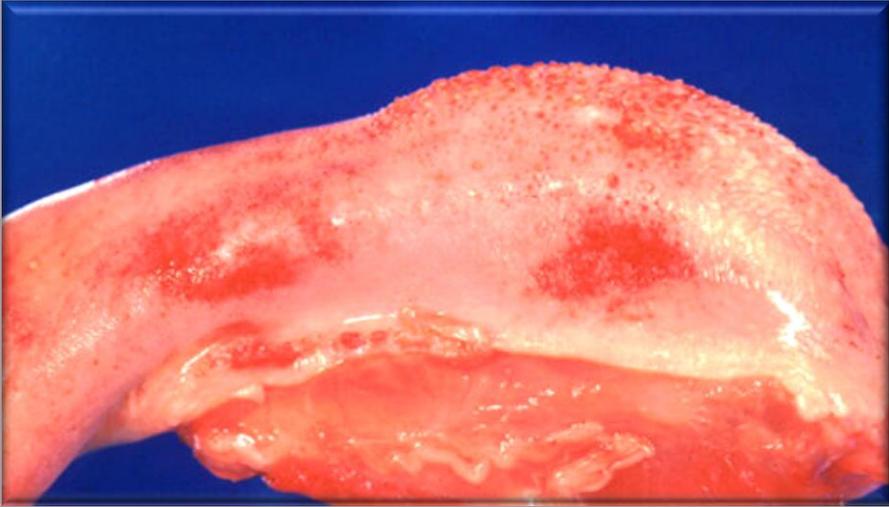
Linfonodi edematosi

Milza ingrossata, emorragie subcapsulari

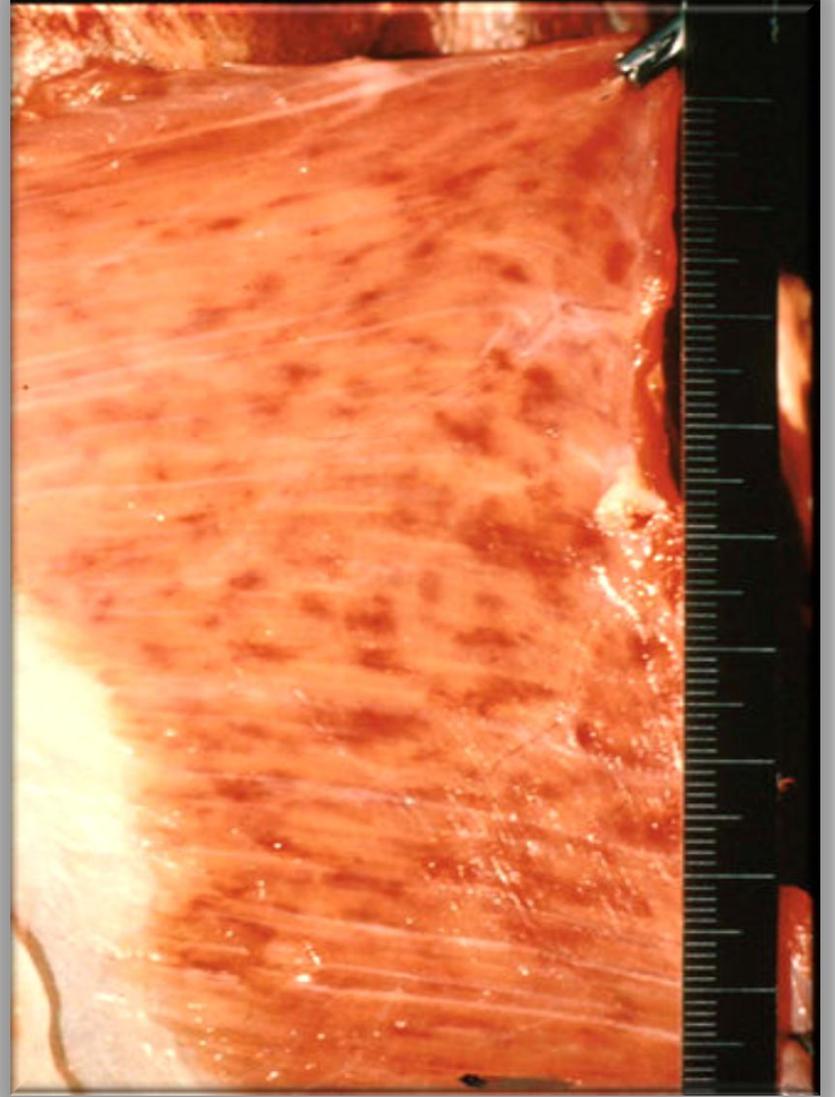
Emorragie e necrosi della muscolatura scheletrica, fibre muscolari pallide, infiltrazioni gelatinose

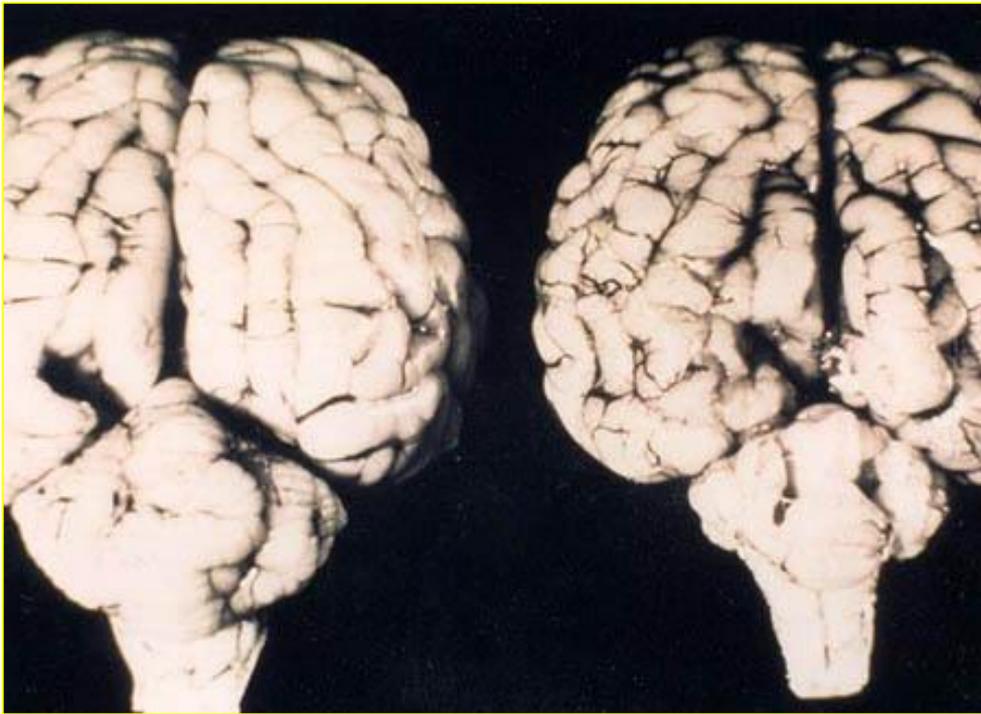
lesioni





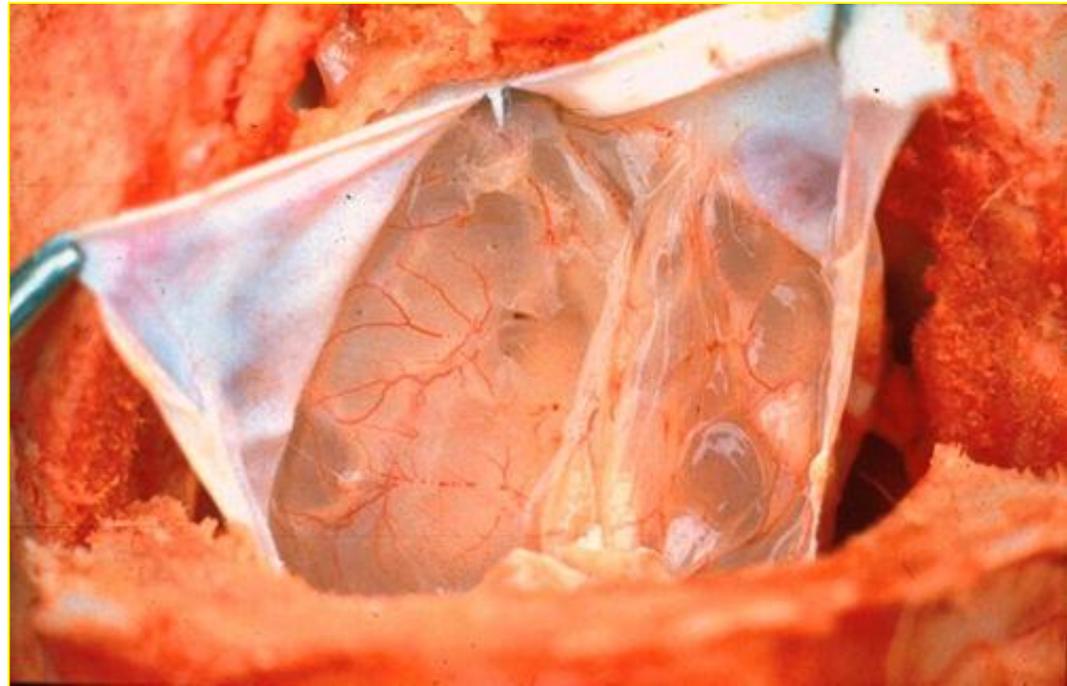






Le infezioni congenite sono responsabili di malformazioni fetali e aborti.

Ipoplasia cerebellare



Idroencefalo

Brain lesions in lambs from MLV-vaccinated ewes

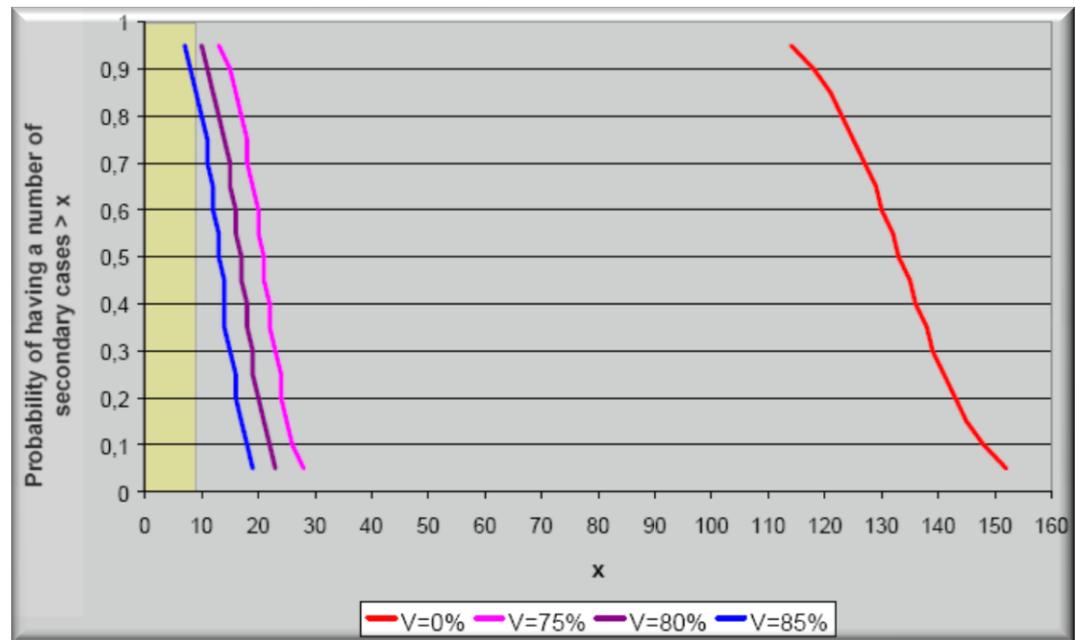


BT in EU: misure adottate

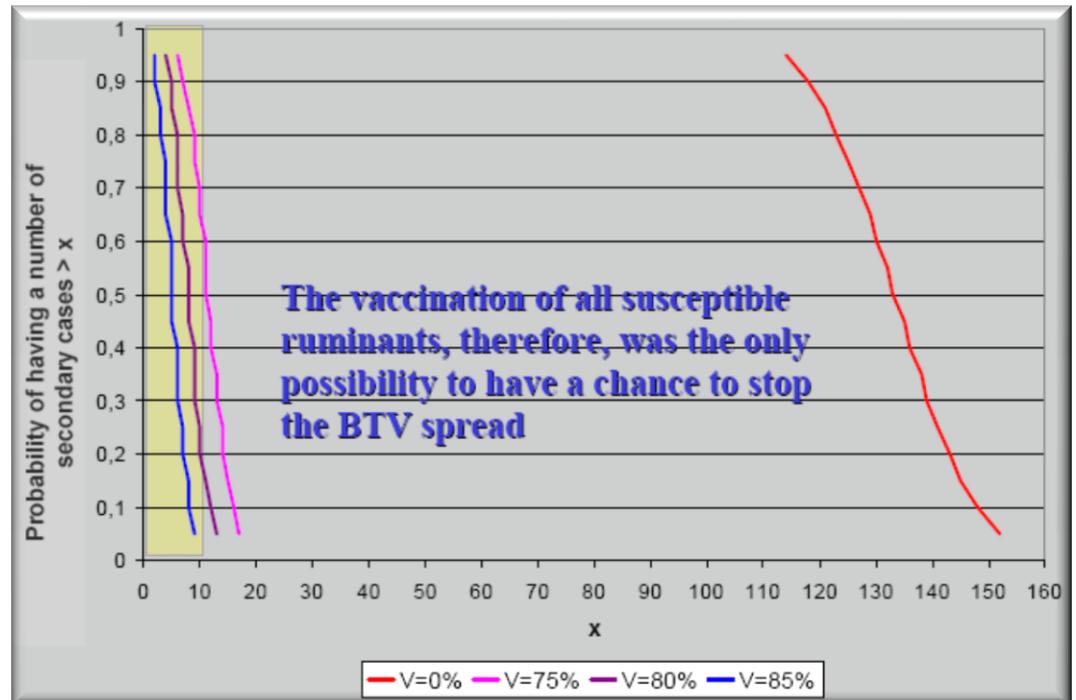
- Protezione degli animali dagli attacchi dei vettori
- Controllo dei vettori
- Abbattimento degli animali infetti
- Restrizioni alla movimentazione di animali, ovuli, seme, embrioni
- Istituzione zone di restrizione (protezione 100 km; sorveglianza 50 km)
- Sorveglianza clinica, sierologica, virologica e entomologica
- VACCINAZIONI

Expected number of secondary cases

Vaccination of sheep and goats only



Vaccination of all ruminants



BT CONTROL: OPEN ISSUES ABOUT VACCINATION

- **compulsory or voluntary?**
- **of what animals ?**
- **when ?**
- **where ?**

BT: controllo in Italia

- Sorveglianza su animali sentinella**
- Sorveglianza entomologica**
- Vaccinazione su base volontaria**
- Aree di restrizione con limitazioni alla movimentazione animale**

Sorveglianza su animali sentinella

Year	No. of tested sentinels	No. of ELISA tests	No. of virus neutralization tests (*)	No. Of RT-PCR
2012	55 566	267 170	1 407	709
2013	41 225	183 428	996	321

(*) For each sample tested by VN, the presence of antibodies against nine serotypes are checked: BTV-1, BTV-2, BTV-4, BTV-6, BTV-8, BTV-9, BTV-14, BTV-15, BTV-16. For number of determinations, therefore, the number in the table must be multiplied by nine.



BT: Sorveglianza entomologica

Year	No. traps	No. <i>Culicoides</i> collections	No. of PCR on <i>Culicoides</i> pools
2012	413	6 431	635
2013	182	3 185	177

The entomological surveillance system is used for defining seasonally free areas and to monitor vector dynamics



Focolai in Sardegna a partire da 01.07.2013 (BTV1)

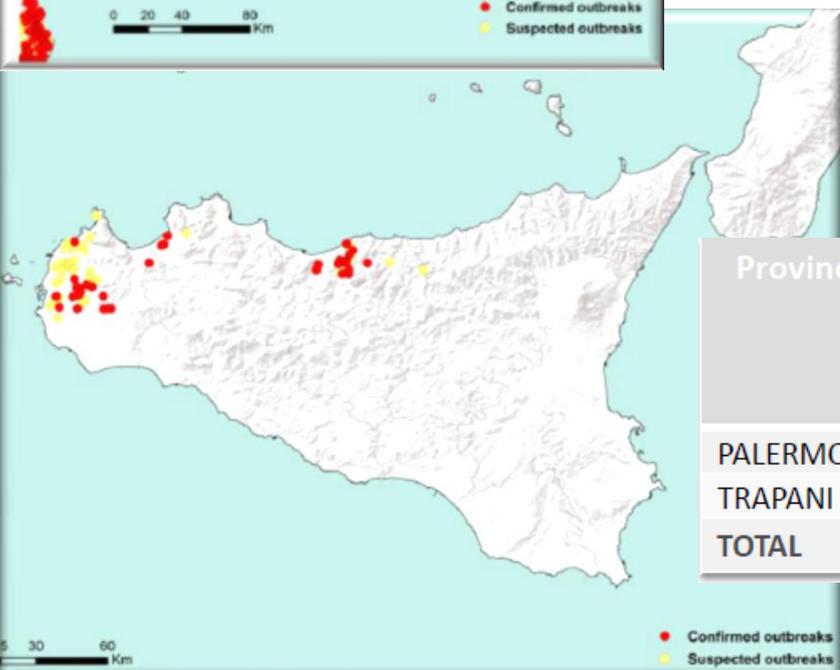
Province	No. of confirmed outbreaks	No. of sheep in diseased flocks	No. of diseased sheep	No. of dead sheep	No. of killed sheep
MEDIO CAMPIDANO	465	164 863	30 365	5 805	0
CAGLIARI	706	231 503	19 798	5 950	1
NUORO	475	130 679	4 113	3 832	0
OLBIA-TEMPIO	206	61 119	7 831	917	0
SASSARI	673	238 005	43 177	6 787	3
CARBONIA-IGLESIAS	15	3 303	747	124	0
OGLIASTRA	121	20 662	2 210	251	0
ORISTANO	255	75 680	19 830	5 157	0
TOTAL	2 916	925 814	128 071	28 823	4

- Morbidity rate: 13.8%
- Lethality rate: 22.5%





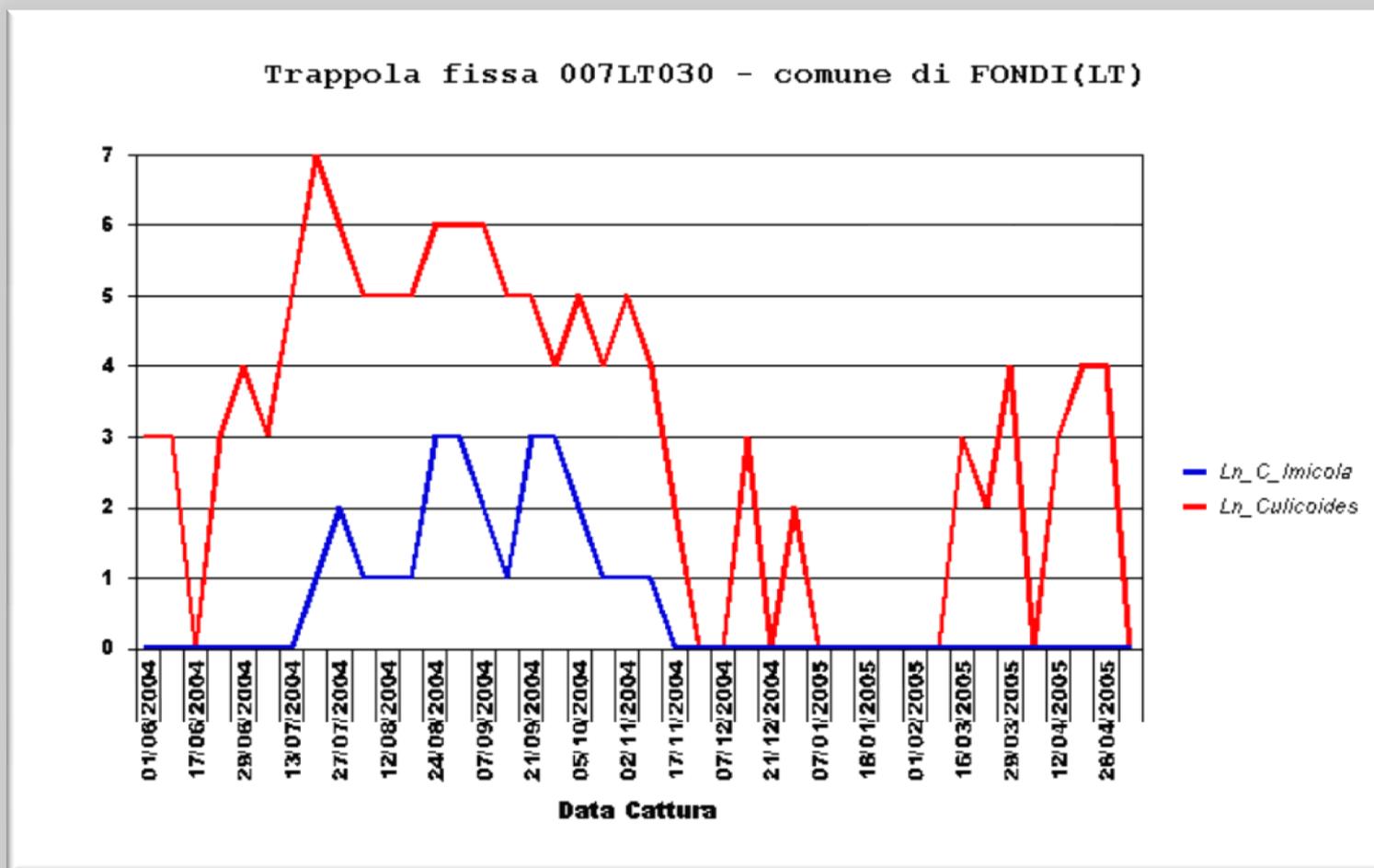
Province	No. of confirmed outbreaks	No. of sheep in diseased flocks	No. of diseased sheep	No. of dead sheep	No. of killed sheep
VITERBO	1	310	4	4	0
TOTAL	1	310	4	4	0



Province	No. of confirmed outbreaks	No. of sheep in diseased flocks	No. of diseased sheep	No. of dead sheep	No. of killed sheep
PALERMO	20	2 734	270	134	0
TRAPANI	17	8 370	587	114	0
TOTAL	37	11 104	857	248	0

BT: sorveglianza in Italia

Sorveglianza entomologica



BT: sorveglianza in Italia

Sorveglianza sierologica

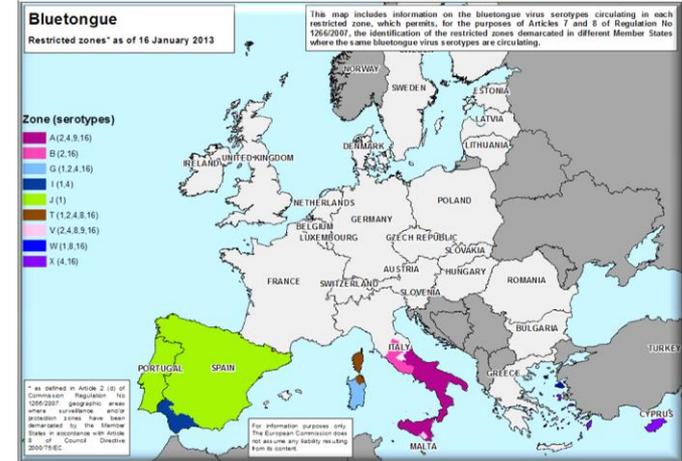
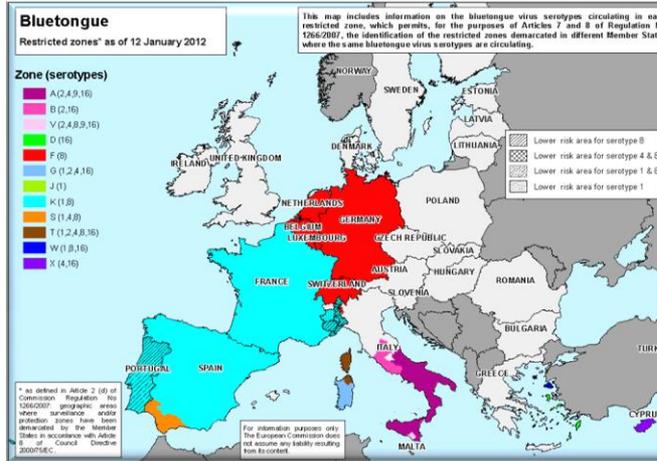
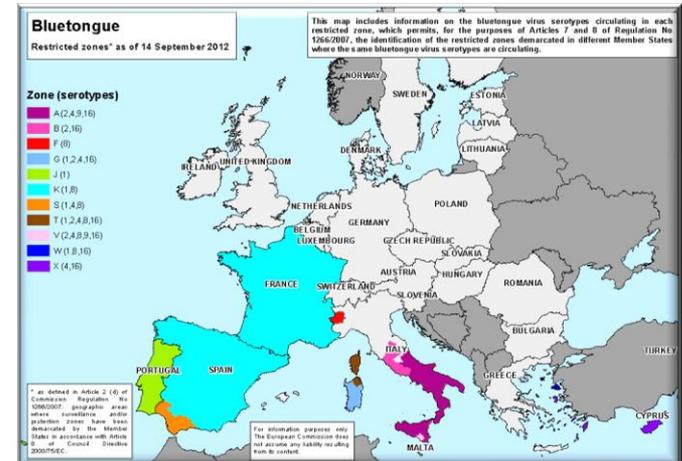
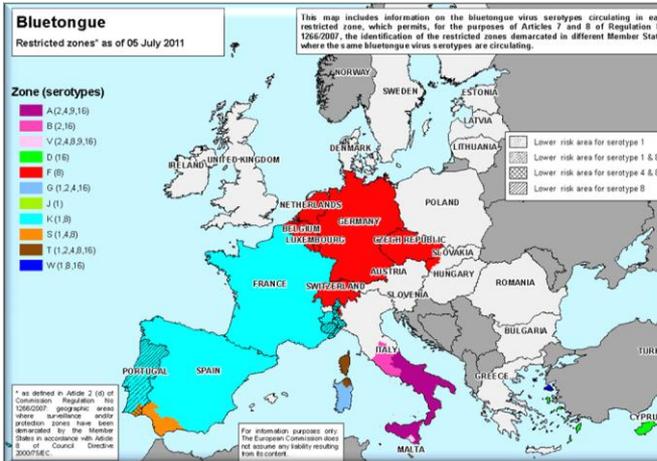
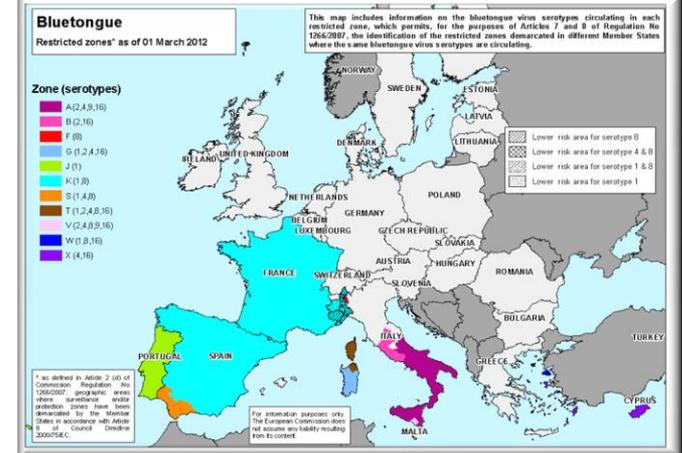
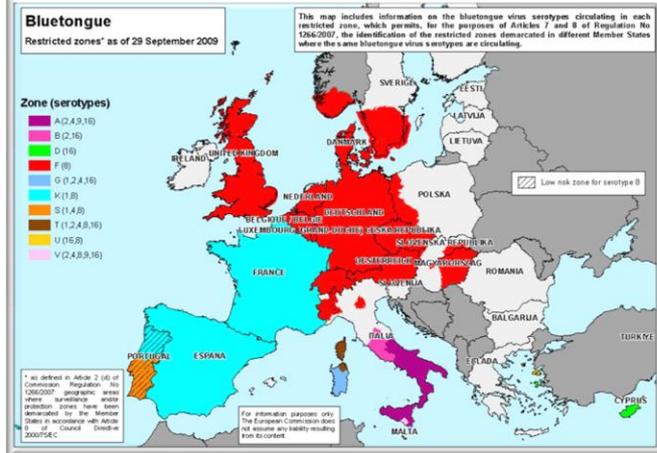
**Piano di sorveglianza sierologica
basato su:**

- **verifica titoli Ab in popolazioni vaccinate**
- **monitoraggio in bovini sentinella**

Ai fini di:

- **rilevare copertura Ab popolazioni vaccinate**
- **rilevare/escludere circolazione virale in aree sottoposte a vaccinazione, in aree sottoposte a misure di restrizione, in aree a maggior rischio di introduzione e nel resto d'Italia**

AREE di RESTRIZIONE in EU (2009 – 2013)



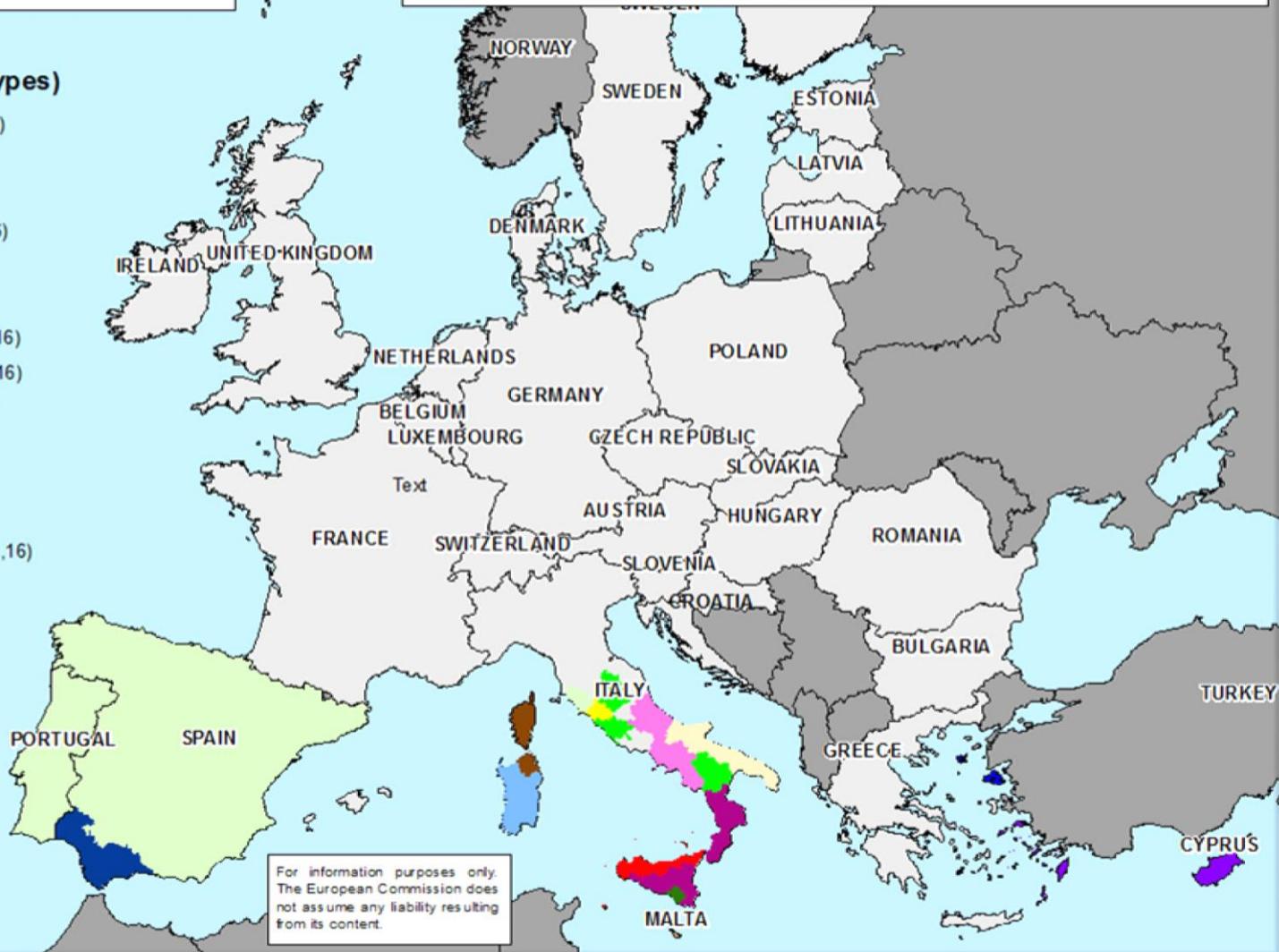
Bluetongue

Restricted zones* as of 04 October 2013

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)

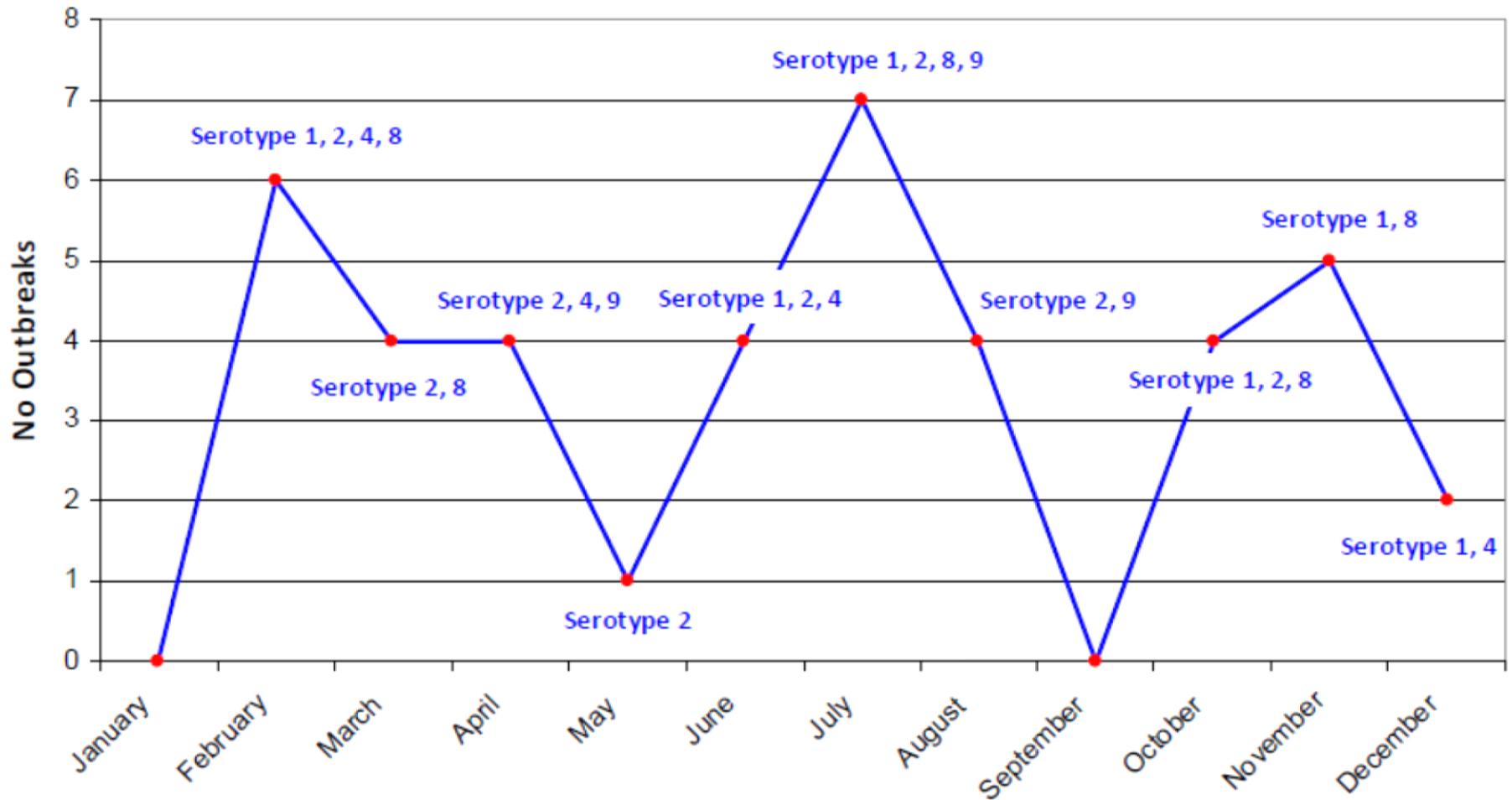
- A (2,4,9,16)
- B (2,16)
- D (16)
- G (1,2,4,16)
- I (1,4)
- J (1)
- T (1,2,4,8,16)
- V (2,4,8,9,16)
- W (1,8,16)
- X (4,16)
- Y (2,9,16)
- Z (1,16)
- A1 (1,2,4,9,16)



* 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.

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FOCOLAI di BT in ITALIA dal 01. 01. 2010 al 31.12.2010



BT IN THE EU: RISKS

- **Establishing of BT in Central and Northern EU**
- **Radial extension of BTV 8 across the EU**
 - **Spain, Italy, Austria, Hungary Sweden and Switzerland were newly infected by BTV8 in 2008, Norway in 2009**
- **Encounter of BTV 8 with the serotypes occurring in the Mediterranean Member States, with an increased potential for reassortments between these virus**
 - **this event has already been demonstrated**

BT IN THE EU: POSSIBLE STRATEGIES TO CONTROL THE SPREAD AND THE ESTABLISHING OF BTV BASED ON QUANTITATIVE RISK ASSESSMENT (EFSA, 2007)

- **Reduce number of adult vectors per host by larval control, insecticides, repellants, animal housing, moving animals into free or low vector density areas**
 - **To be effective this number should be reduced to < 10 midges/animal/day**

BT IN THE EU: POSSIBLE STRATEGIES TO CONTROL THE SPREAD AND THE ESTABLISHING OF BTV BASED ON QUANTITATIVE RISK ASSESSMENT (EFSA, 2007)

- **Shorten stationing of infected animals in free areas (e. g. during transports)**
 - **If an infected animal transits a free area with Culicoides activity for more than 3 days, spread of BTV could occur if the vectors density is > 160/animal/day**

BT IN THE EU: POSSIBLE STRATEGIES TO CONTROL THE SPREAD AND THE ESTABLISHING OF BTV BASED ON QUANTITATIVE RISK ASSESSMENT (EFSA, 2007)

- **Reduce duration of viremia in animals by mass vaccination**
 - **If viremia duration is reduced on average to less than 1 week, the vaccination programme could be effective with vectors density between 30 and 100 midges/animal/day**

BT IN THE EU: POSSIBLE STRATEGIES TO CONTROL THE SPREAD AND THE ESTABLISHING OF BTV BASED ON QUANTITATIVE RISK ASSESSMENT (EFSA, 2007)

- **None of these actions is able by itself to stop the spread of BT. Strategic combination of several measures should be applied**
- **The epidemic pattern depends on type and date of introduction of BTV in new areas**
 - **Introduction of infectious midges in free areas is associated with higher incidences than introduction of infectious animals**
 - **Introduction of BTV is associated with higher incidences if it occurs before the peak of vector density than if it occurs at the peak**

BT IN THE EU: CONTROL POLICIES

- **The strategic main option is mass vaccination with all available vaccines, preferably with inactivated vaccines. The goals of mass vaccination are:**
 - **to reduce direct and indirect losses**
 - **to ensure resistance to infection**
 - **to reduce virus circulation**
 - **to make animals safe to move to free zones**
 - **to reduce the extent of restriction zones**

Movimentazione animali sul territorio nazionale (Circolare MdS 01.06.2009)

- ✓ Movimentazione libera di tutti gli animali provenienti da zone indenni e per animali destinati direttamente al macello
- ✓ Movimentazione subordinata alla vaccinazione per animali >90 gg. da zone non indenni o alla definizione di accordi interregionali
- ✓ Movimentazione animali non vaccinati <90 gg da zone non indenni subordinata alla definizione di accordi interregionali

BT IN THE EU: SOME NOT WELL KNOWN RELEVANT ISSUES

- **Where does BTV go during the long (6 – 11 months) intraepidemic silences ?**
- **What is the biology of *C. obsoletus*, *C. scoticus*, *C. pulicaris*, *C. dewulfi*, *C. chiopterus* ?**
- **What is the epidemiological role of wild ruminants ?**
- **What is the clinical impact of BT in fetuses/newborn/adults ?**

Does BT represent a model of further possible vector-borne emerging diseases such as West Nile Fever, African Horse Sickness, Rift Valley Fever ?

BLUETONGUE – diagnosi

Su base epidemiologica, clinica
d.d. afta, ectima contagioso, vaiolo ovino, PPR

▪ Diagnosi di laboratorio:

Identificazione Ag

- VN per sierotipizzazione
- PCR (sequenziamento del gene VP2 per sierotipizzare, VP3, VP7, NS1 per sierogruppo)

▪ Identificazione Ab:

- ELISA (MAb) competitiva
- SN per distinguere Ab nei confronti dei diversi sierotipi

