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"G. CAPORALE"

Bluetongue: an unpredictable disease that continually surprises

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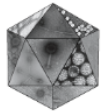
WOAH Meeting 2025

What should be known about BTV and BT

Definition

- **Bluetongue** is an infectious, non contagious, mostly vector borne viral disease which affects wild and domestic ruminants
- The Bluetongue virus could be present wherever climatic and environmental conditions (temperature, precipitation, vegetation, and susceptible hosts) allow the survival of Culicoides midges





Virus Taxonomy
The ICTV Report on
Virus Classification and Taxon Nomenclature

Book: [Reovirales](#)

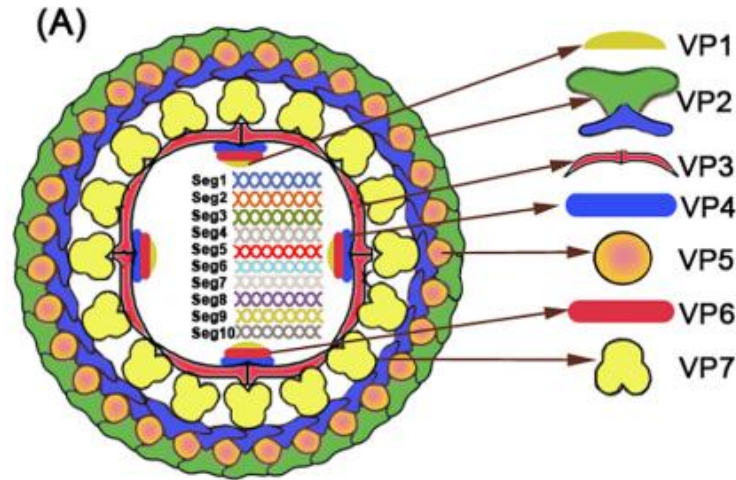
▼ Order: Reovirales

▼ Sedoreoviridae

▼ Family: Sedoreoviridae

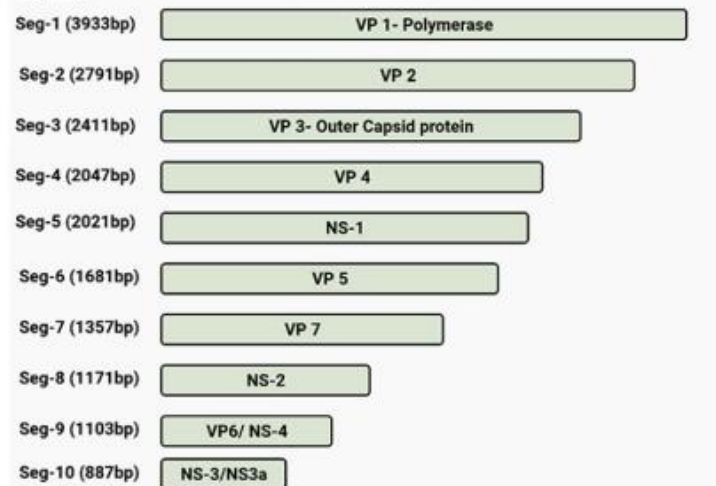
- Genus: Cardoreovirus
- Genus: Mimoreovirus
- Genus: Orbivirus
- Genus: Phytoreovirus
- Genus: Rotavirus
- Genus: Seadornavirus

What should be known about BTV and BT



Diameter: 80 nm in
No envelope
10 segments dsRNA

(B)

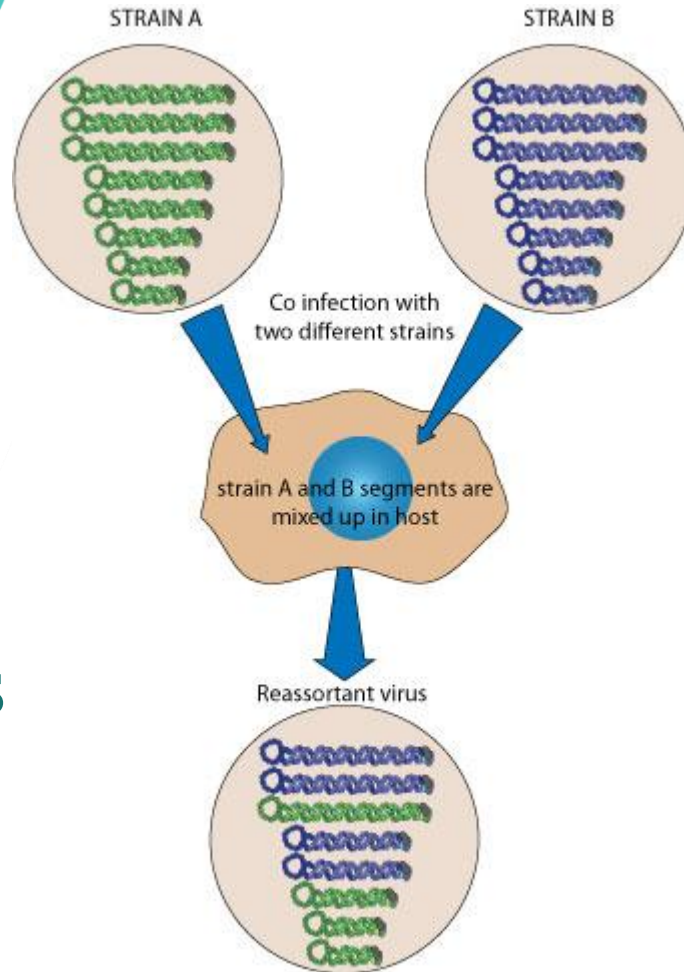


Subhadra et al., 2023

Segmented genome

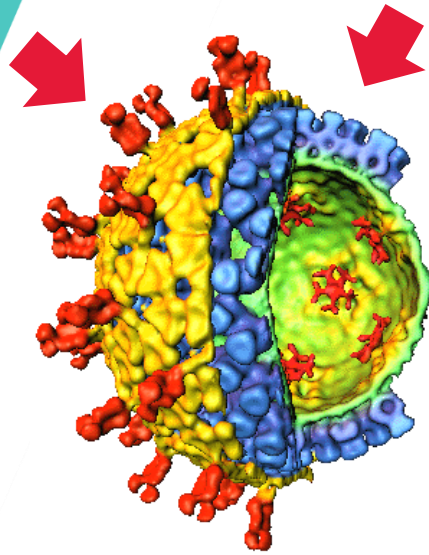
Virus

What should be known about BTV and BT

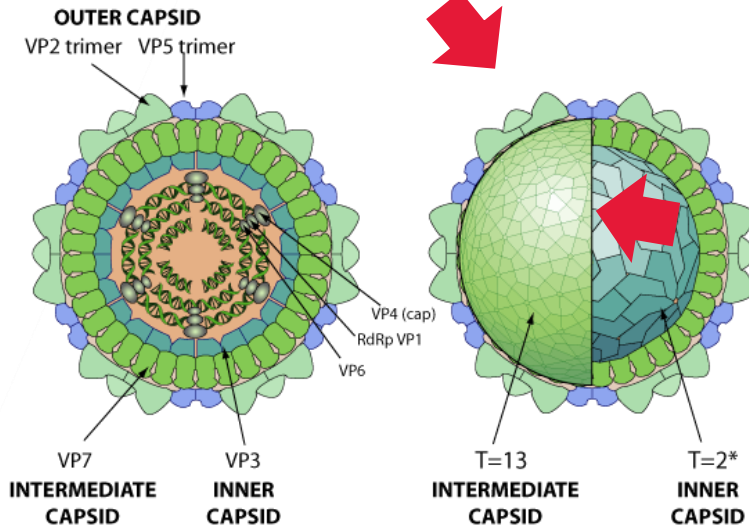


A characteristic of segmented genome viruses is their ability to undergo **gene reassortment** when two viral strains co-infect the same cell.

What should be known about BTV and BT



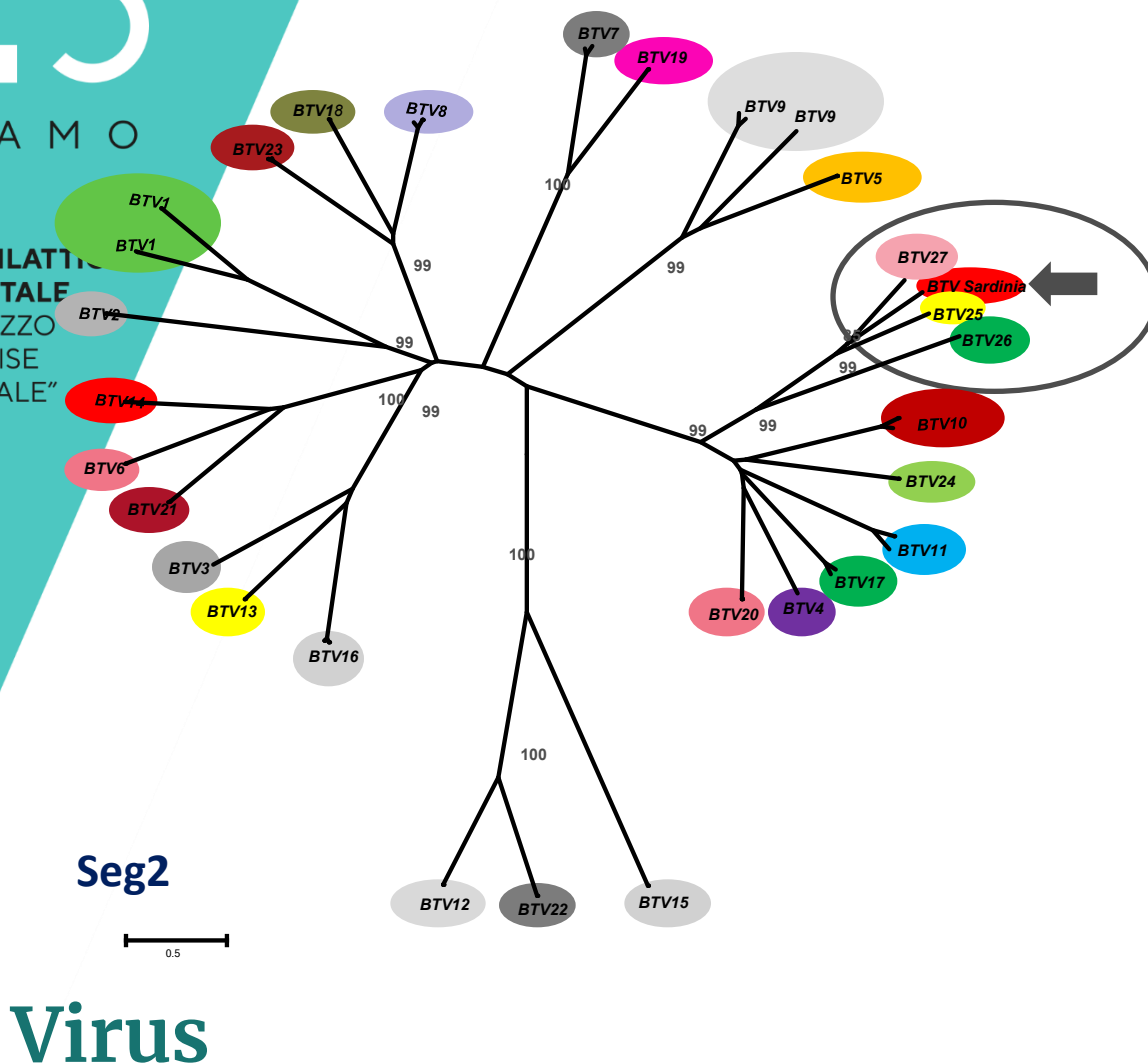
VP7: is similar to all virus serotypes and distinguishes the virus as a species/serogroup



VP2: is different in each serotype and identifies the virus serotypes

Virus

What should be known about BTV and BT



Traditional serotypes

- Up to now 24 serotypes have been identified, they are partially correlated each other determining *in vitro* cross-reactions and *in vivo* cross-protection

Atypical serotypes

- In the last 20 years, 15 atypical serotypes have also been detected (possible direct transmission)

What should be known about BTV and BT

Viraemia

Vertebrate hosts

❑ Cattle

❑ VI: 5-60 gg

❑ RT-PCR: 5-180 gg

❑ Sheep

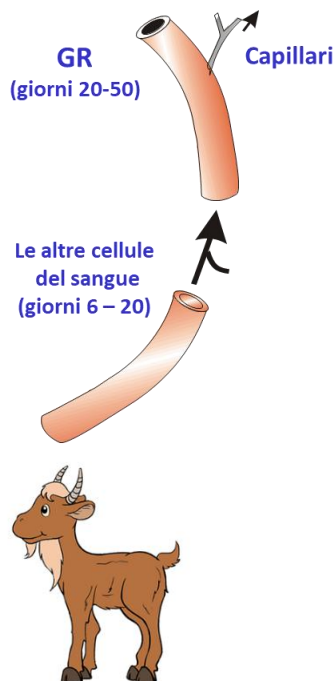
❑ VI: 5-30 gg

❑ RT-PCR: 5-100 gg

❑ Goats

❑ VI: 5-30 gg

❑ RT-PCR: 5-100 gg



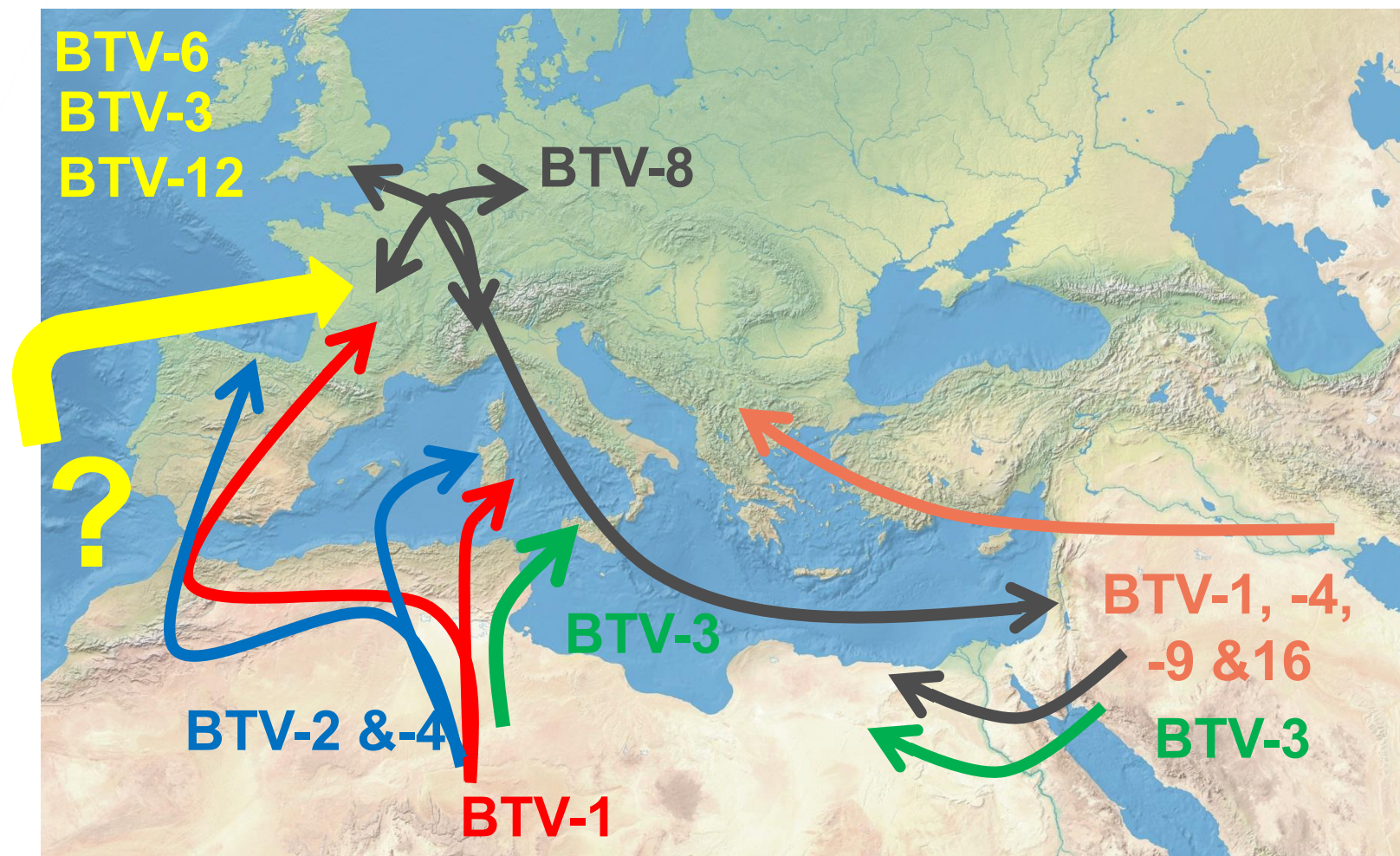
VI: epidemiological importance
RT-PCR: diagnostic importance



Infected vectors

The vector, after becoming infected, **is capable of transmitting the infection**, after an incubation period of 7-10 days, **for the duration of its life**, which averages 21 days but varies with temperature.

An unpredictable disease



BTV incursions in the Mediterranean region and Europe

An unpredictable disease

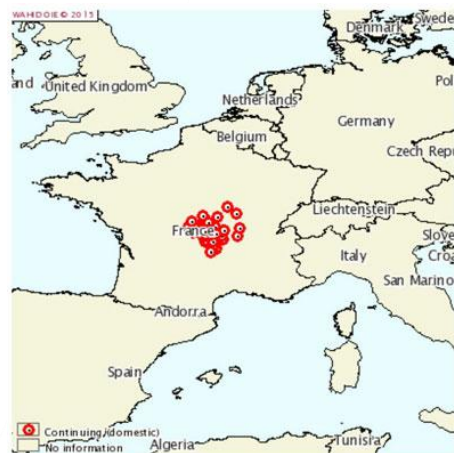


Fig. 1: Distribuzione geografica degli focolai d BTV8 in Francia (Fonte: OIE)

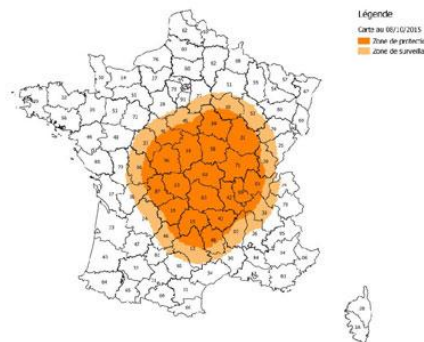
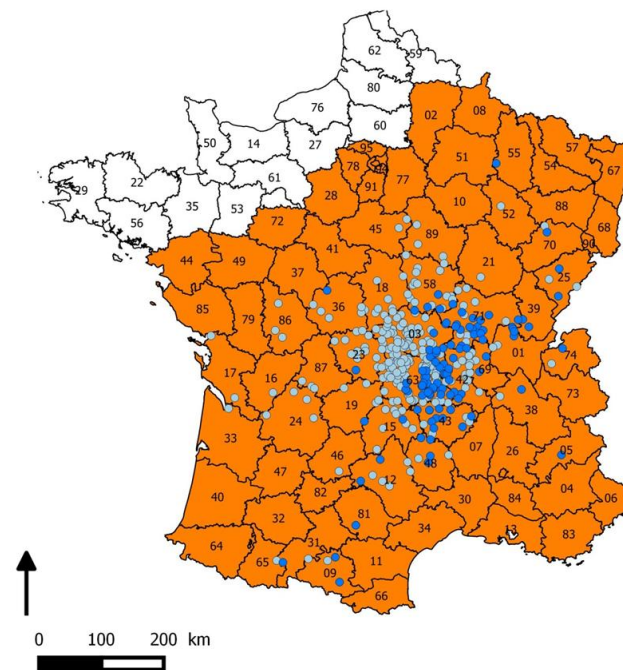


Fig. 2: Delimitazione delle zone di protezione e delle zone di sorveglianza in Francia (Fonte: OIE)

Situation au 29/09/2016

- foyers BTV8 notifiés entre septembre 2015 et juin 2016
- foyers BTV8 notifiés depuis juillet 2016

Zone réglementée
 ■ BTV1 2 4 8 16
 ■ BTV8



Reappearance of BTV-8 in France in 2015

An unpredictable disease



Fig. 1: Distribuzione geografica degli focolai d BTV8 in Francia
(Fonte: OIE)

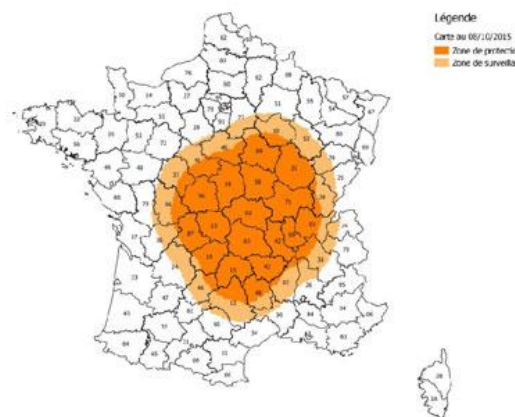
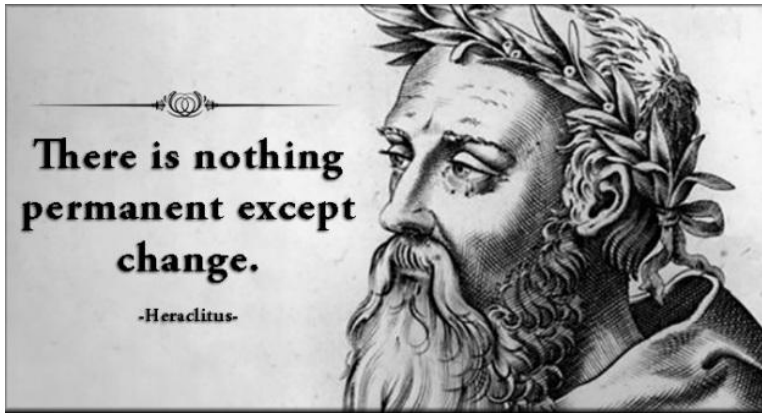


Fig. 2: Delimitazione delle zone di protezione
e delle zone di sorveglianza in Francia (Fonte: OIE)

Reappearance of BTV-8 in France: the strain was genetically similar to the 2006 isolate (Breard et al., 2016); however, unlike previous outbreaks, no clinical symptoms were observed in the infected animals.

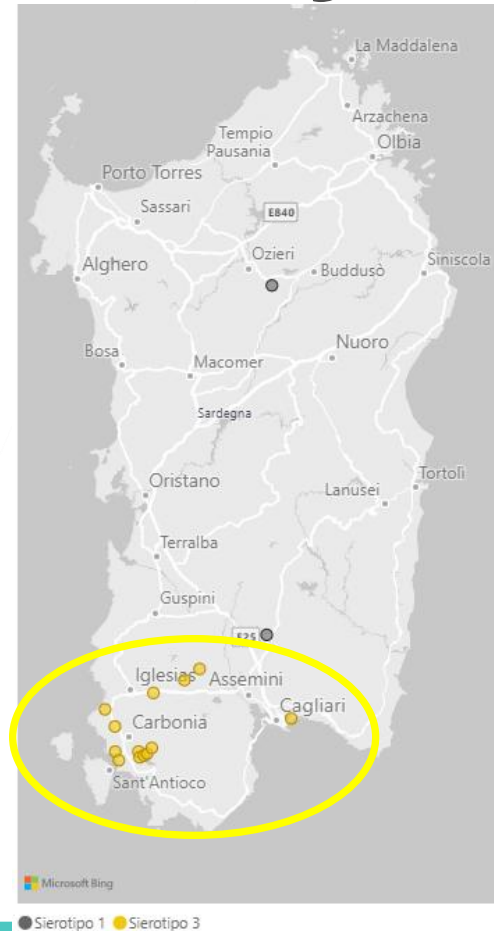
However, we must never forget that BTV loves to surprise



Because of its extraordinary plasticity of the genome and of the disease, dealing with bluetongue virus, we must *be prepared to be surprised and to continuously adapt our understanding.*

However, we must never forget that BTV loves to surprise

2023



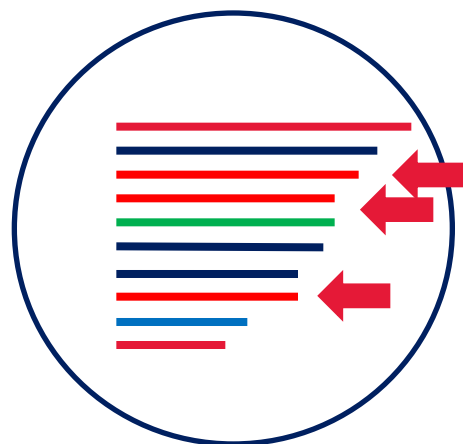
2024



- ✓ **BTV-3** was first reported in Sardinia in **2018**.
- ✓ Its genome sequence confirmed the **Northern African origin** (Tunisia).
- ✓ After several years of limited local circulation in **South Sardinia**, BTV-3 re-emerged in 2024, expanding beyond its historically affected areas and spreading **throughout** the entire region.

However, we must never forget that BTV loves to surprise

BTV-4
BTV-2
BTV-1



BTV-3 2024

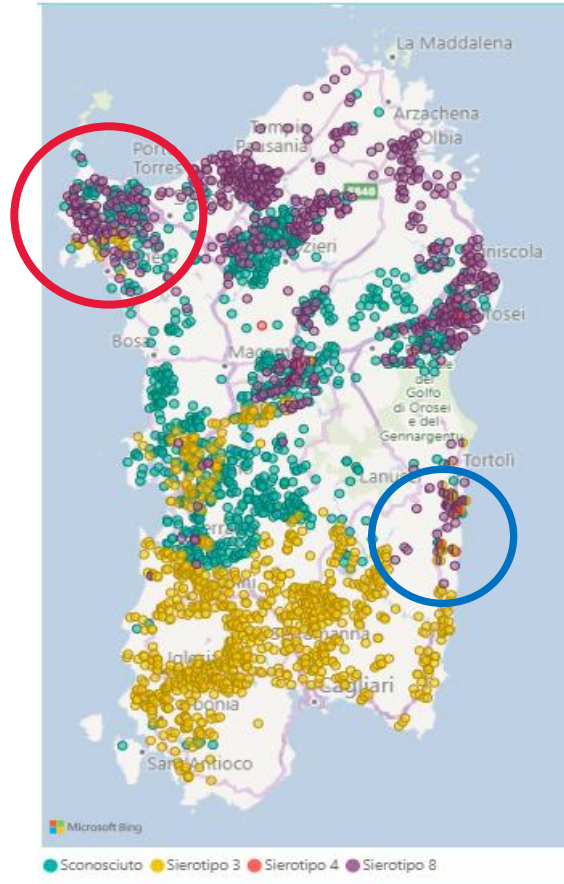


BTV-3 2022

- What is the reason for the change in behavior of BTV-3?
 - The BTV-3 of 2024 is slightly different from the strain of 2022.
 - It appears to be a new reassortant strain with BTV-4 (African strain).
 - A more detailed phylogenetic study is currently underway.
- A BTV-3 vaccine will work against this particular strain?

However, we must never forget that BTV loves to surprise

**BTV-3 &
BTV-8**

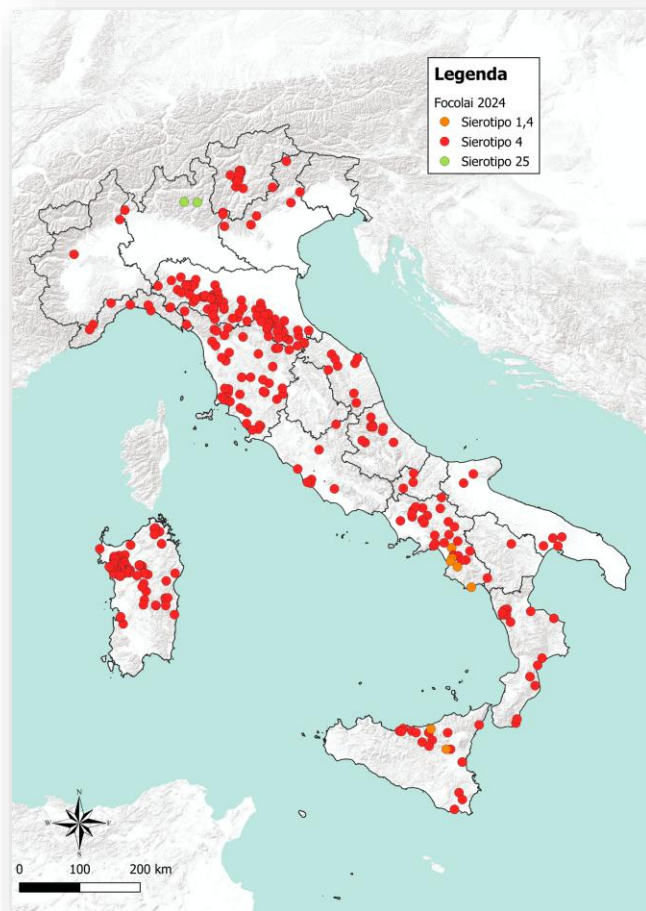


**BTV-3, BTV-8
and BTV-4**

- A deeper analysis of the situation in Sardinia :
 - there are numerous areas where different strains and serotypes (**BTV-3, BTV-4, and BTV-8; BTV-3 and BTV-8, BTV-4 and BTV-8**) are co-circulating.
 - These conditions represent the ideal circumstances for the phenomenon of reassortment to occur.

However, we must never forget that BTV loves to surprise

2024



Outbreaks with viral co-circulation were notified, in detail 1 from **BTV-3 and BTV-4** in the Autonomous Province of Trento, 34 from **BTV-3 and BTV-8** in Sardinia and 18 from **BTV-4 and BTV-8** in Calabria, Emilia-Romagna, Sardinia and Tuscany.

2023

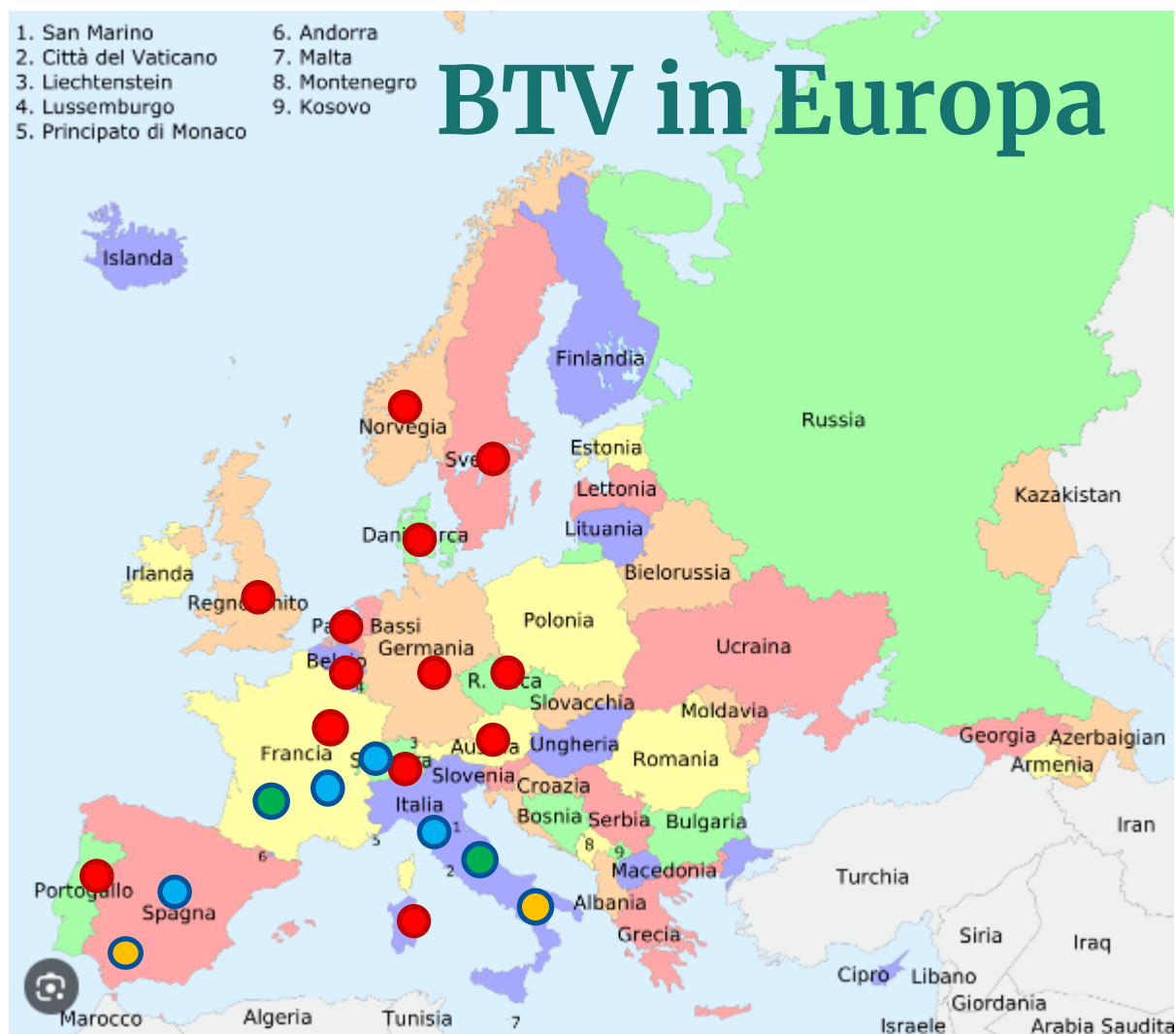
- After Italy, the **Netherlands** notified the presence of **BTV-3** in Europe on 06/09/2023.
- The virus then spread throughout the country. BTV-3 was then detected in **Belgium** on 29/09/2023, reaching the **French border** on 25/07/2024, in **Germany** on 10/10/2023 and in the **UK** on 26/11/2023.

BTV in Europe

2024

During 2024, numerous **Bluetongue serotype 3 and serotype 8** outbreaks were notified in Europe, also affecting countries historically free of the disease.

- BTV-3
- BTV-8
- BTV-1
- BTV-4



However, we must never forget that BTV loves to surprise

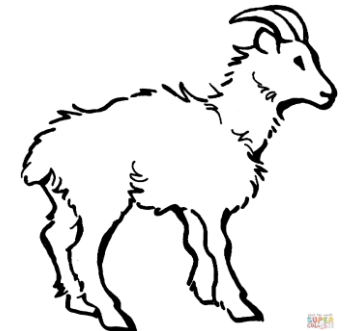
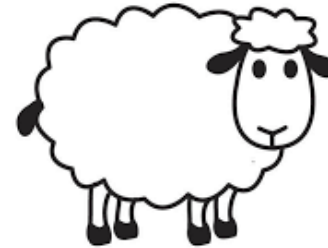
Traditional serotypes

- *Cattle as reservoir*
- *Can cause severe clinical signs*
- *Transmitted by vectors*
- *Restriction measures*



Atypical serotypes

- *Goats or sheep as reservoir*
- *Mild or no clinical signs*
- *Direct transmission (at least some of them)*
- *No restriction measures*



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Thank you for your attention!