

Vector Monitoring and its Impact on Bluetonguevirus (BTV) Eradication

Univ. Prof. Dr. Friedrich Schmoll

AGES: Austrain Agency for Health & Food Safety

Bluetonguevirus (BTV)

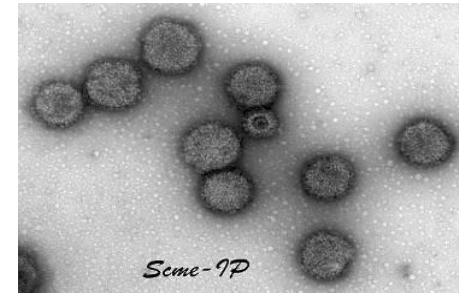
Family Reoviridae

Genus Orbivirus

several serotypes 24

1. BTV-25 – CH (2008)
2. BTV-26 – Kuwait (2010)
3. BTV->26

transmitted by blood sucking vector



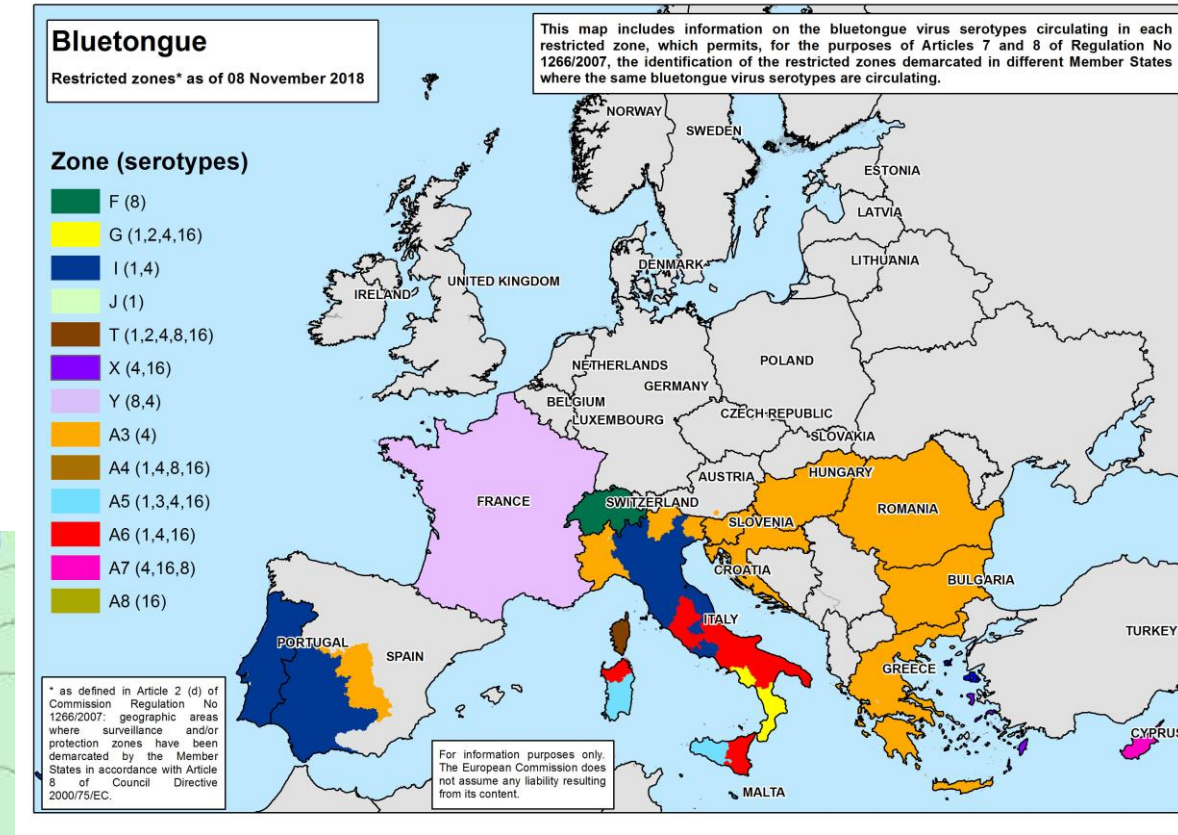
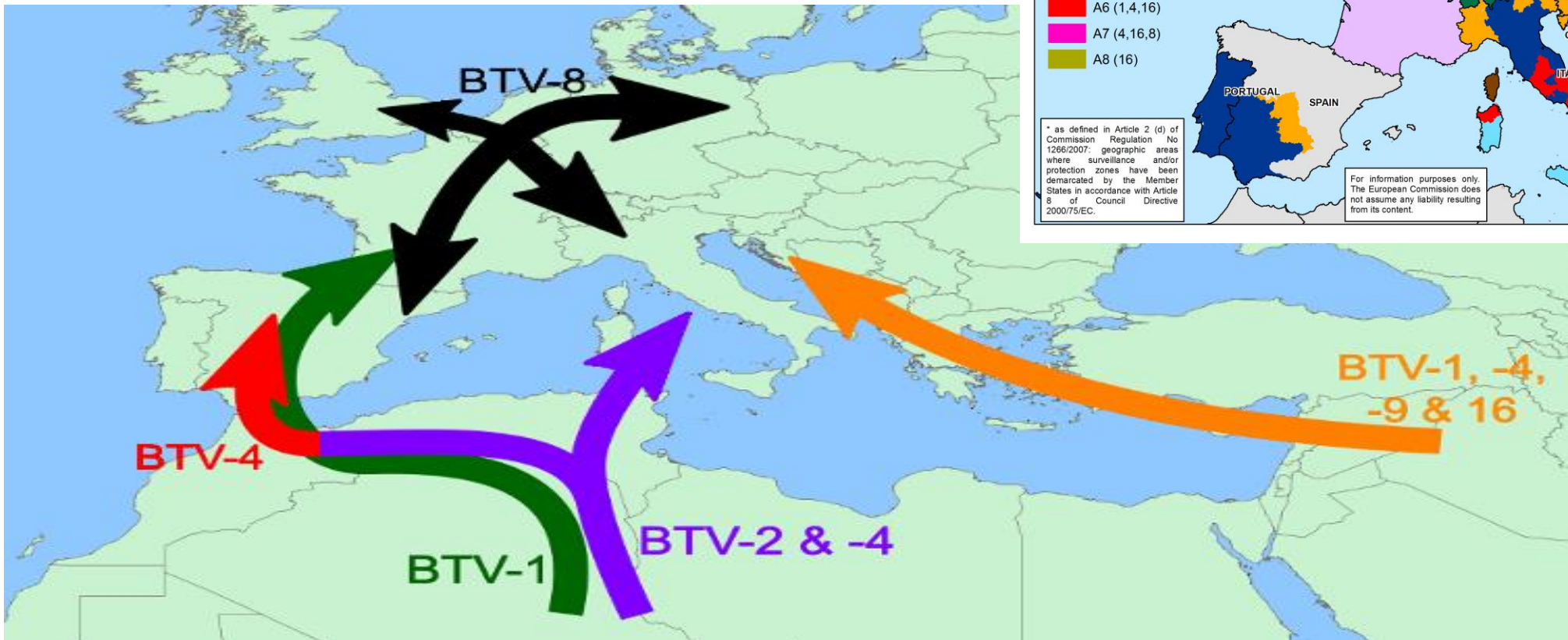
Bluetongue Europe

1st description 1905 in South Africa

BTV-8

2001 detected in Europe – Greece

2006 in middle Europe (BTV-8), NI, Belgium, Germany

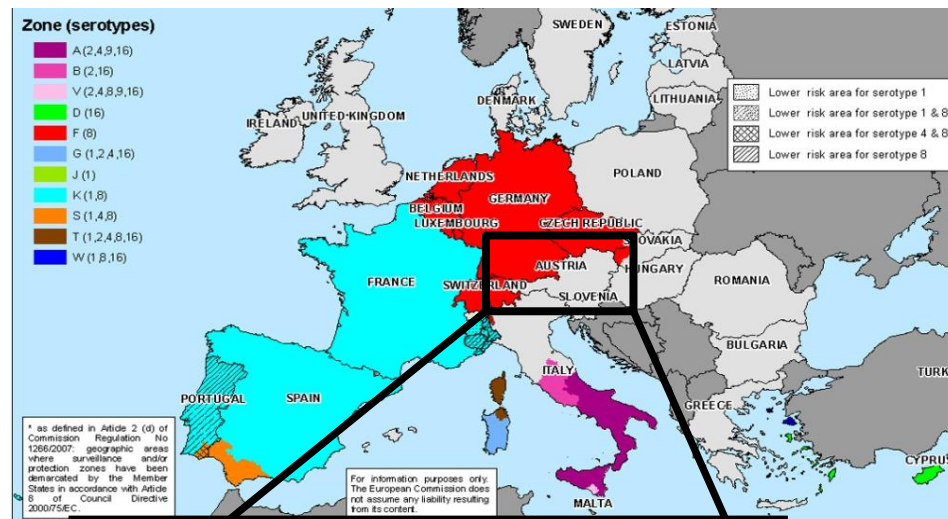


2018

BTV-8 in Austria

BT-8 Cases and surveillance in AT 2008- 2011

- total number of BT tests carried out 2008-2010: **187.058**
- total outbreaks of BT detected: **28 animals, 14 holdings**
- obligatory BTV-8 vaccination (2008)



Based upon the results from the surveillance programme Austria regained Status

**„Free from BT“
in March 2011**

Bluetongue

Epidemiology

Culicoides (insect host)



Semen, Blood

- Non-contagious by casual contact
- Some midges like *Culicoides* (insect host) transmit BTV among susceptible ruminants
- These insect hosts became infected by feeding on viraemic animals (vertebrate host)

Seasonal vector-free period

Definition

- According to EU regulation 1266/2007
- Start of the seasonal vector-free period
 - as of the beginning of December, and/or
 - after 6 consecutive days with frost ($T_{\min} < 0^{\circ}\text{C}$)
- Ending of the seasonal vector-free period
 - Catches with one *Culicoides imicola* or more than 5 (parous) *Culicoides obsoletus* and/or
 - after 7 consecutive days with mean daily temperature $> 10^{\circ}\text{C}$ and so the beginning of the vector activity can be expected.



Vector monitoring since 2015

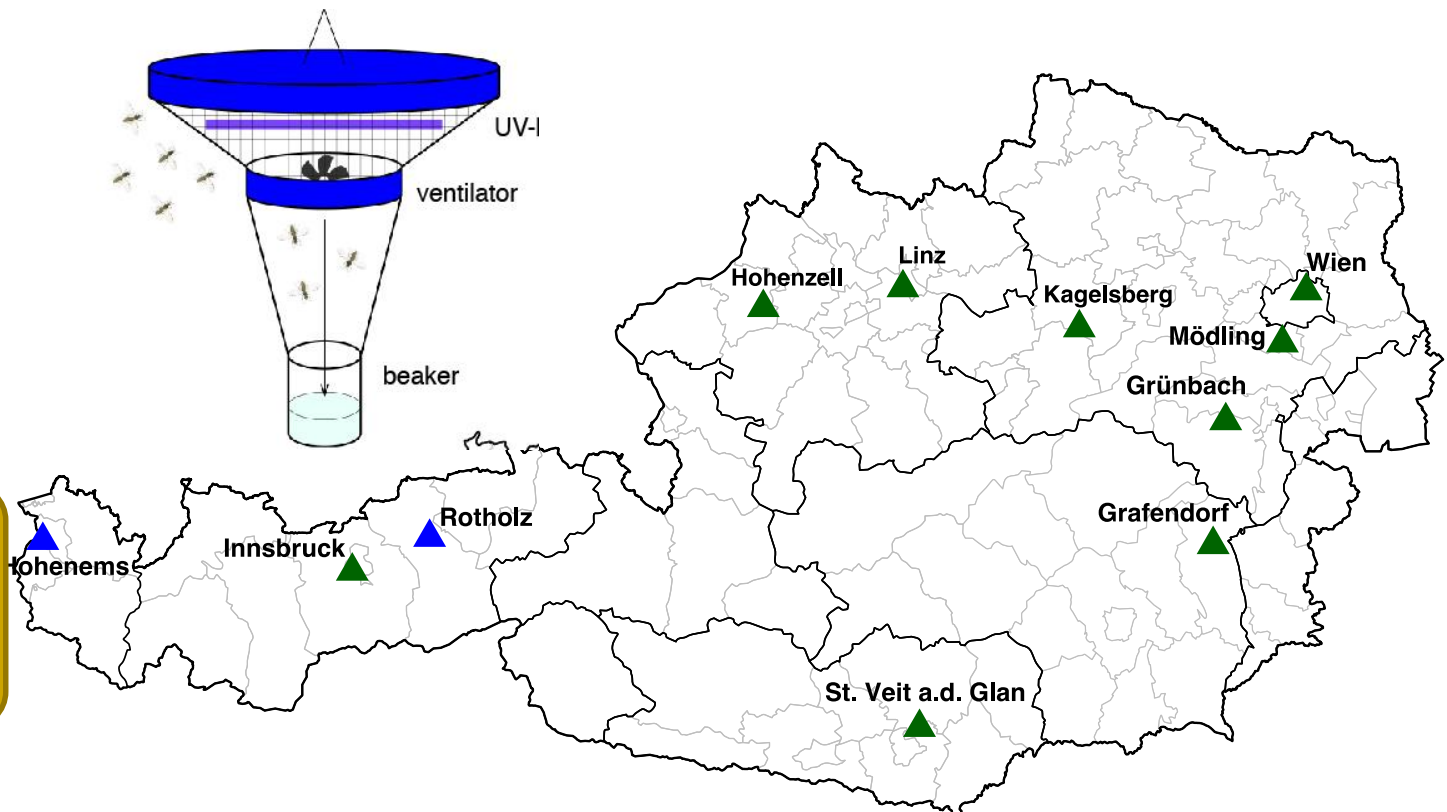
BMASK, AGES, Vetmeduni Vienna

↪ Determination of vector-free periods for loosening trade and movement restrictions of susceptible livestock

↪ Vector monitoring at

- 9 sites since Dec. 2015,
- 11 sites since Dec. 2018
- Sampling plan:
 - Oct.-Nov. weekly,
 - Dec.-Feb. monthly,
 - March-April weekly

Btv-8
CH
Nov
2018



According to EU regulation 1266/2007

Vectormonitoring

Determination of vectors: characteristic pattern and coloration of wings

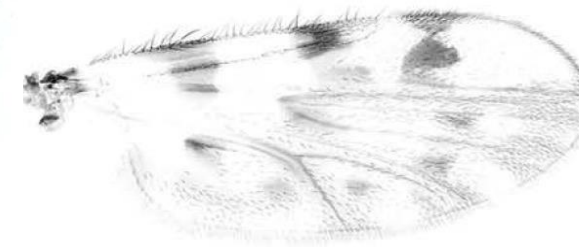


Culicoides obsolete



Mehlhorn et al. (2007)

Culicoides obsolete



Mehlhorn et al. (2007)

Culicoides pulcaris

(Rawlings, 1996; Goffredo & Meiswinkel, 2004).

Vectormonitoring

Identification of *Culicoides* spp. by microscope

Culicoides spp.

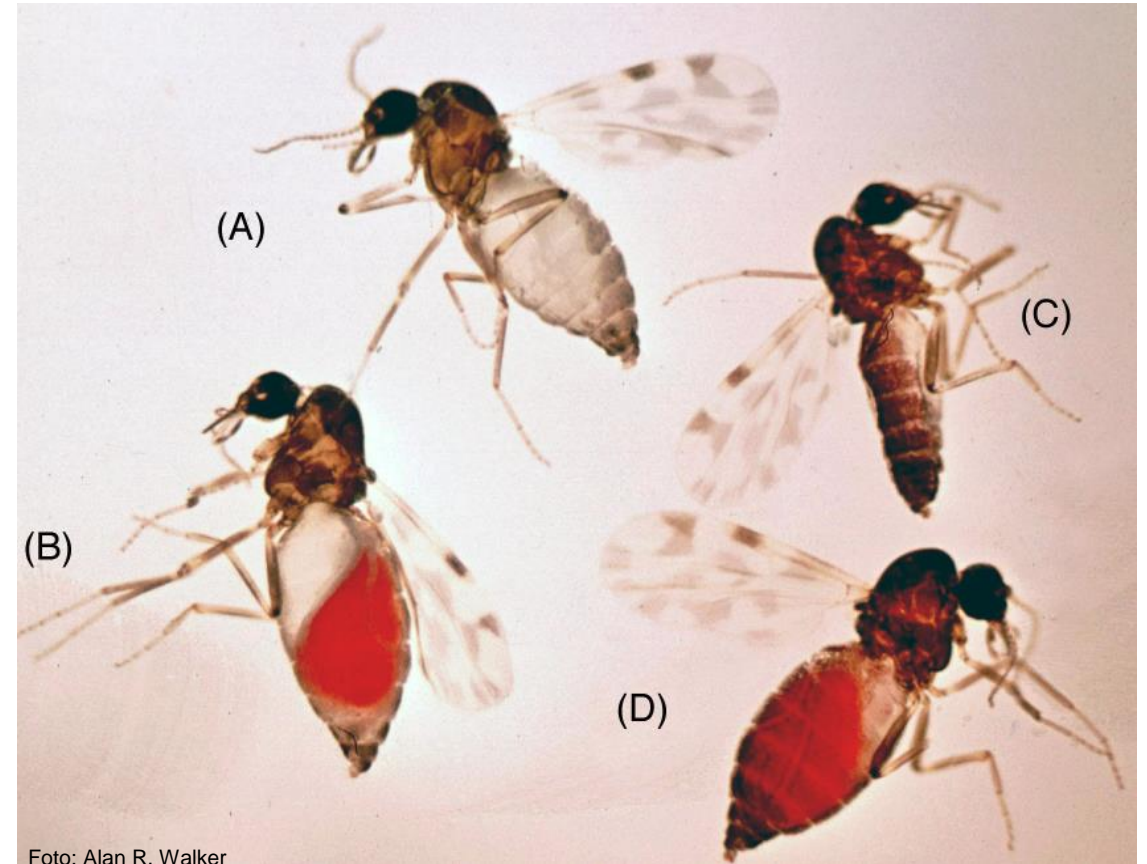


before
blood suckling

Culex spp,
Aedes spp.



after
blood suckling



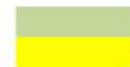
nullipare

pare *C. imicola*

Vector monitoring 2017/18 BTV: Austrian

Standort	Vektorfreier Zeitraum 1.12.2017 bis 30.4.2018																				
	Oktober				November					Dez.	Jän.	Feb.	März					April			
	KW 40	KW 41	KW 42	KW 43	KW 44	KW 45	KW 46	KW 47	KW 48	KW 49	KW 2	KW 7	KW 10	KW 11	KW 12	KW 13	KW 14	KW15	KW16	KW 17	
Wien	5/28	21/11	7/6	9/6	0/0	0/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	2/0	36/2	
Innsbruck	2/0	3/5	5/2	0/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	
Linz	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0	
Mödling	10/8	23/19	2/3	0/0	0/5	0/4	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	7/1	65/5	
Kagelsberg	10/31	0/2	0/2	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	3/0	0/0	50/1	
Grafendorf	>50/>50	>50/>50	>50/>50	>50/>50	1/9	>10/>50	0/0	0/0	0/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0	14/0	158/3	1/1	
Grünbach	0/0	1/0	0/2	0/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0	5/0	102/24	
Hohenzell	0/0	11/8	0/3	0/2	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0	0/0	>50/>10	
St. Veit an der Glan	>50/>50	>50/>50	24/47	10/20	>20/>50	>20/>50	0/2	0/20	na/na	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	6/1	178/0	>50/>10	

Anzahl nullipare/pare Gnitzen
na ... keine Probe



keine Gnitzen



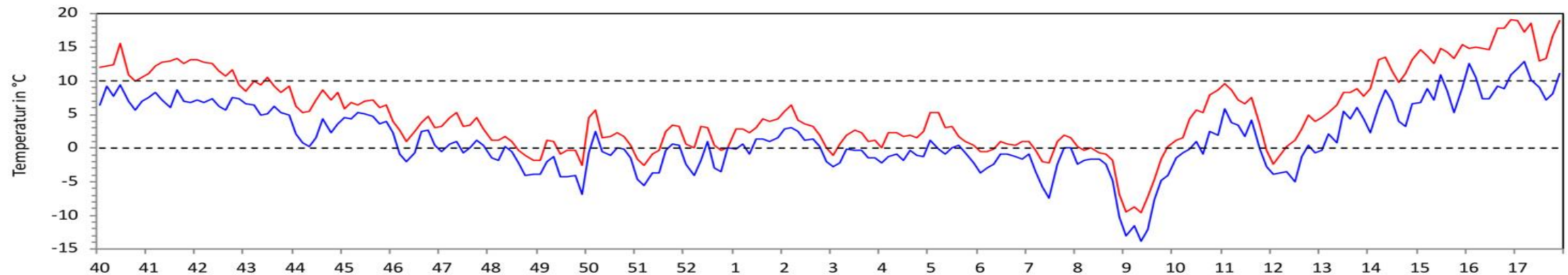
nullipare Gnitzen



< 5 pare Gnitzen



≥ 5 pare Gnitzen



Tagesmitteltemperatur bzw. Temperaturminimum (gemittelt über die Stationen Wien, Graz, Innsbruck, Klagenfurt, Linz)

Vector-free period of the last three seasons

2015 - 2018

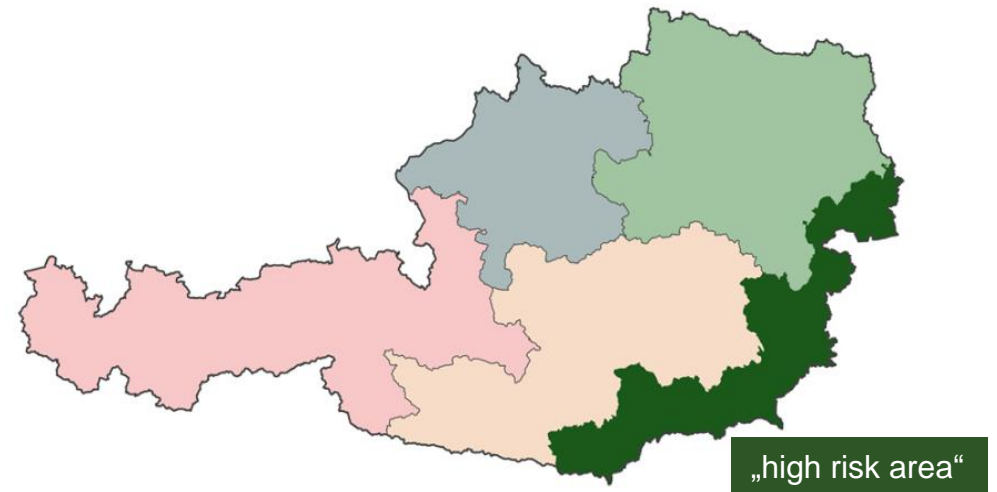


Season	Vector-free period	Days	Weeks
2015/16	15.12.2015–21.04.2017	129	18.5
2016/17	02.12.2016–14.04.2017	134	19
2017/18	01.12.2017–30.04.2018	151	22
	MEAN	138	20
2018/19	01.12.2018–30.04.2019		

BTV-4 Austria 2015 (1)

Introduction south-east (Hungaria, Slovenia)

- ↪ Austria increased the monitoring activities in the eastern part of the country.
 - Ministry adapted the active BTV surveillance program by defining a „high risk area“ at the Austro-Hungarian Border in April 2015.
- ↪ In the high risk area,
 - 150 samples were taken per month in order to detect a prevalence of 2 % with a confidence of 95 %.
 - Within each of the remaining regions, 35 samples were taken four times a year (detection of 10 % prevalence with 95 % confidence).
 - The target animals were unvaccinated cattle, older than 12 month and free ranged.

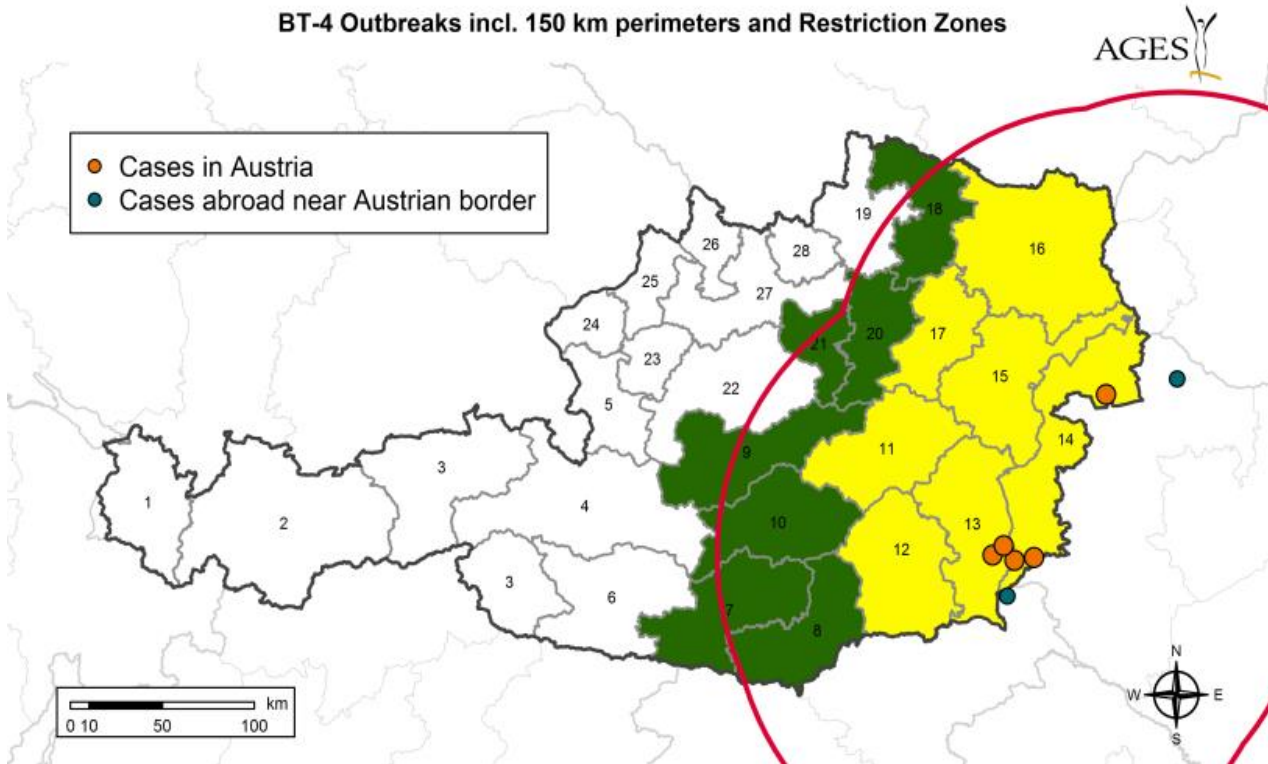


BTV-4 Austria 2015-2018

Cases, restriction zones

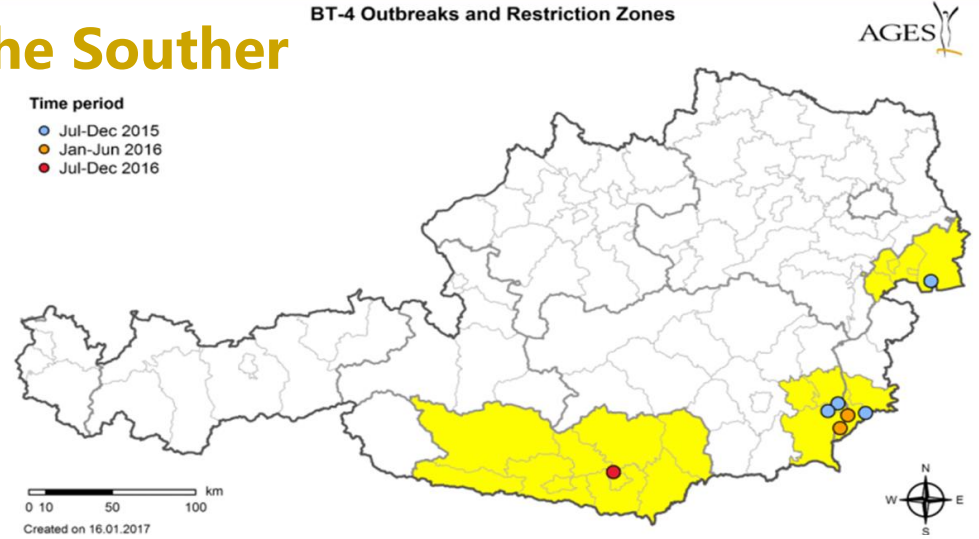
lifting of the Eastern zone and amendment of the Southern

BT-4 Outbreaks incl. 150 km perimeters and Restriction Zones

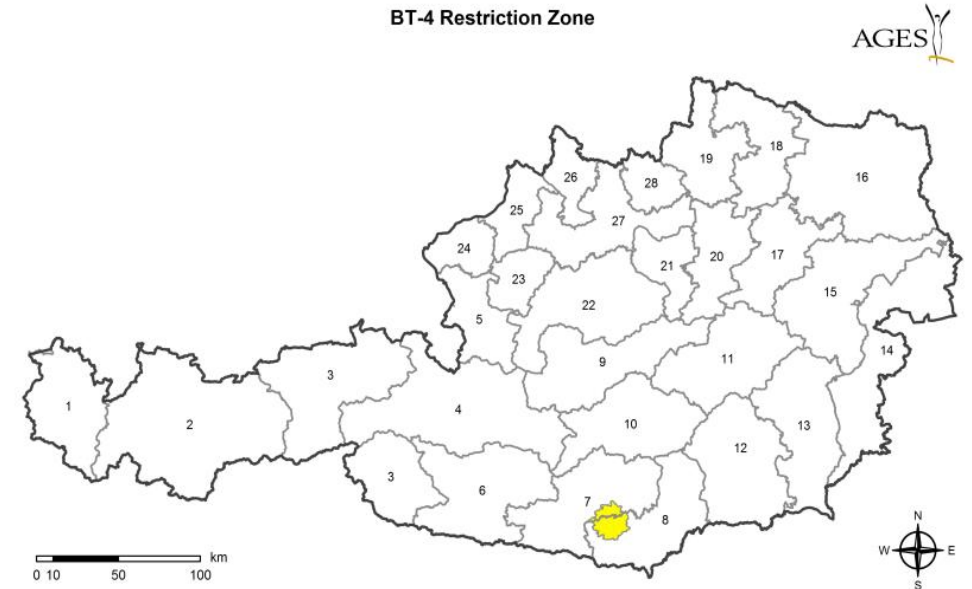


Austria has been divided into 28 regional units
60 samples of cattle were taken quarterly in each regional unit
disease free status with a targeted prevalence of 5 %

BT-4 Outbreaks and Restriction Zones



BT-4 Restriction Zone



BTV surveillance program and other BTV investigations



Year	No. of cattle in AT	Active surveillance	Additional investigations (incl. trade-related)	Total sampling of herds
2015	1.965.515	3.242	8.751	1.289
2016	1.953.201	5.424	19.671	2.636
2017	1.965.618	6.928	13.590	2.384
2018 (Jan-June)	1.954.008	3.120	10.414	1.199

Trends and spatial distribution of Culicoides in Europe

climate zones

Cfb

warm temperate
fully humid climate
with warm summers

Csa/Csb

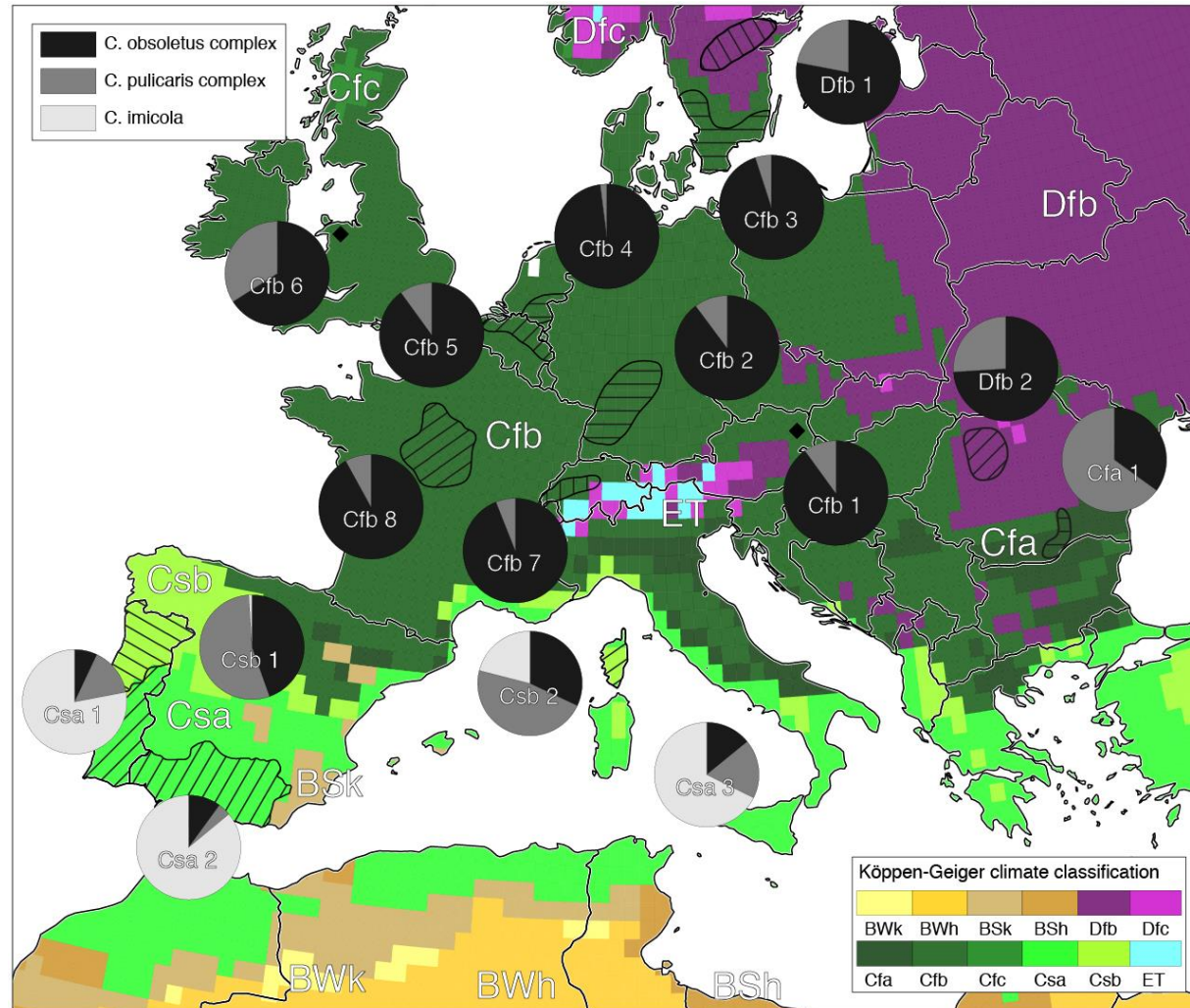
warm temperate dry
climate with
warm/hot summers

Dfb

continental humid
climate with warm
summers

Cfa

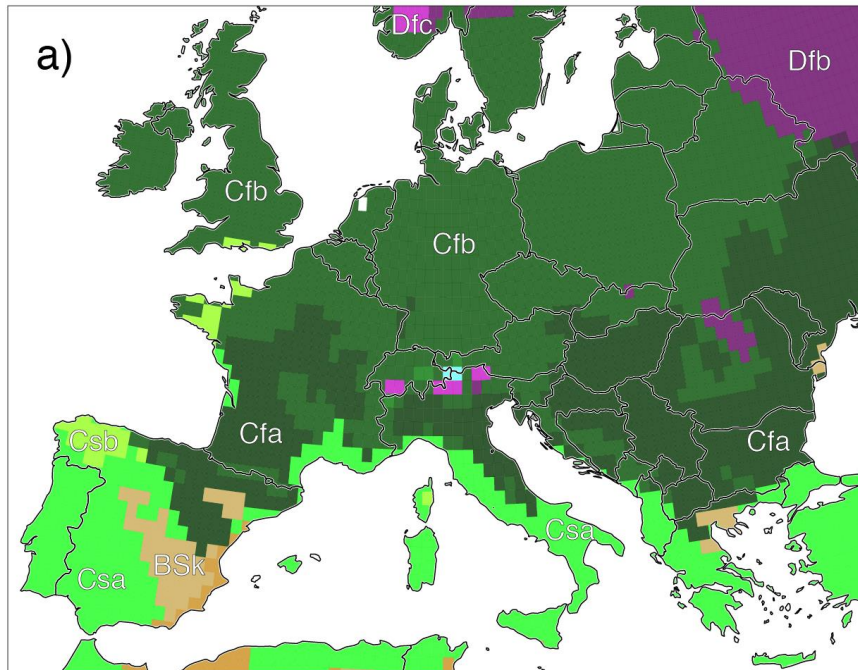
warm temperate
climate with hot
summers



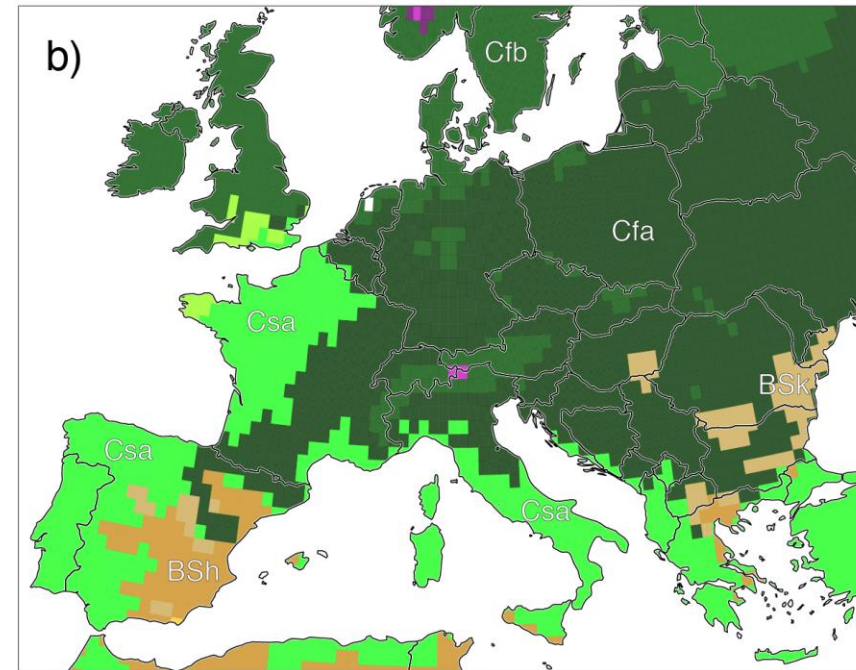
Climate change

Risk assessment for the period 2076–2100

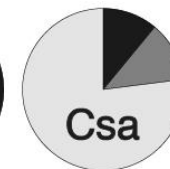
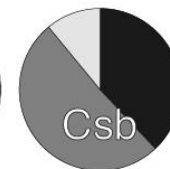
Best-case scenario



Worst-case scenario



■ C. obsolete complex
■ C. pulicaris complex
■ C. imicola

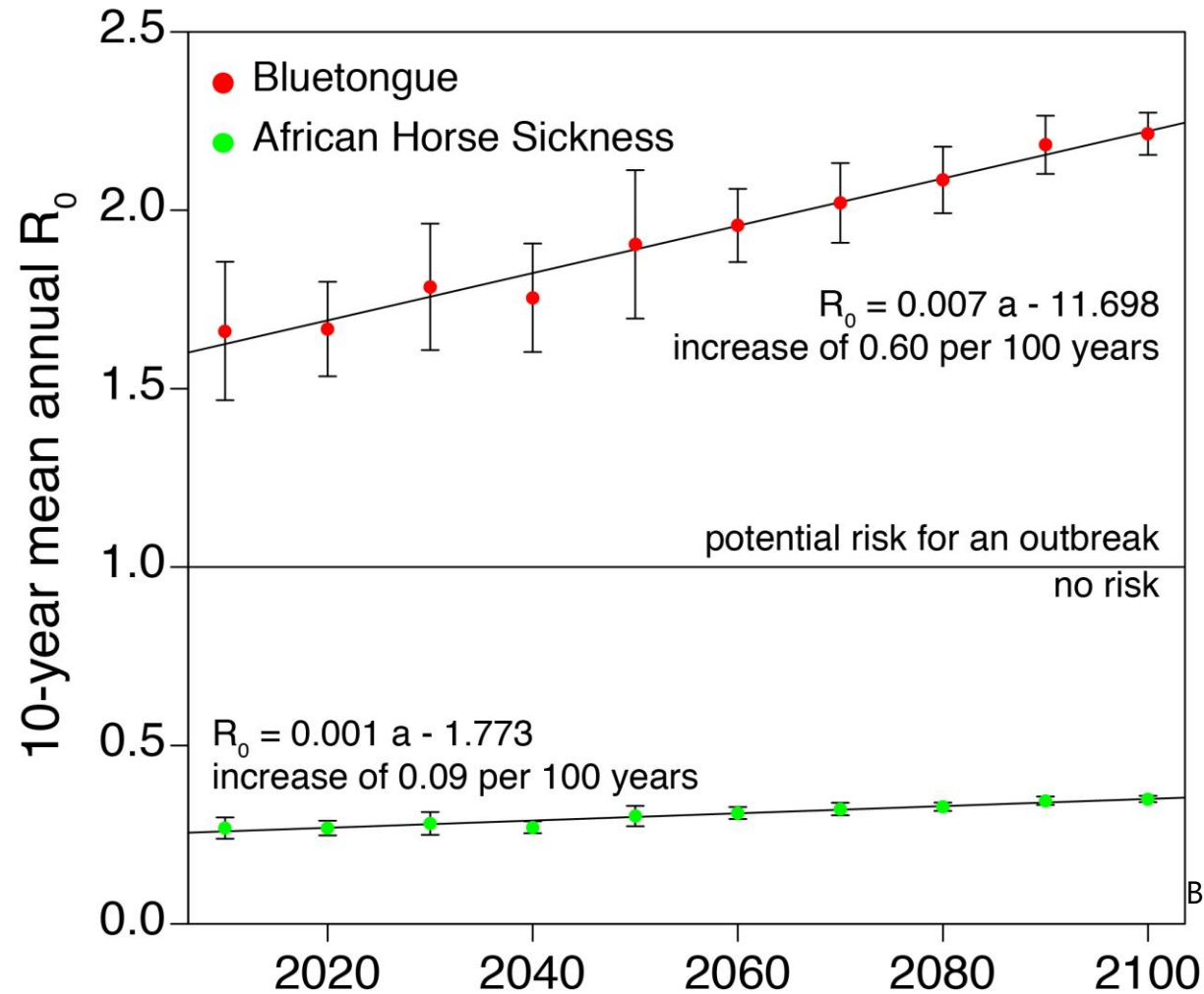


Brugger & Rubel, 2013,
Parasit. Vectors

Is there are a risk for an outbreak within the next 100 years?



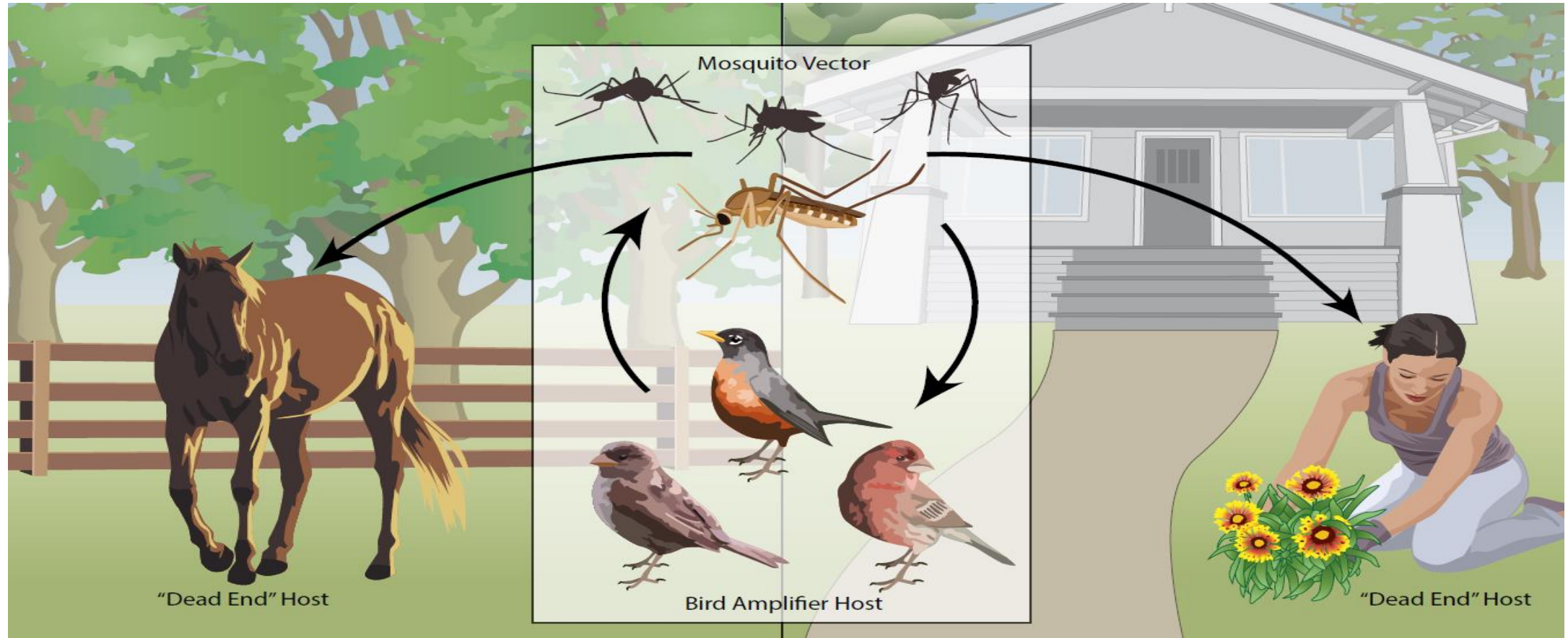
Bluetongue and African Horse Sickness



Brugger et al., 2016, BMC Vet. Res.

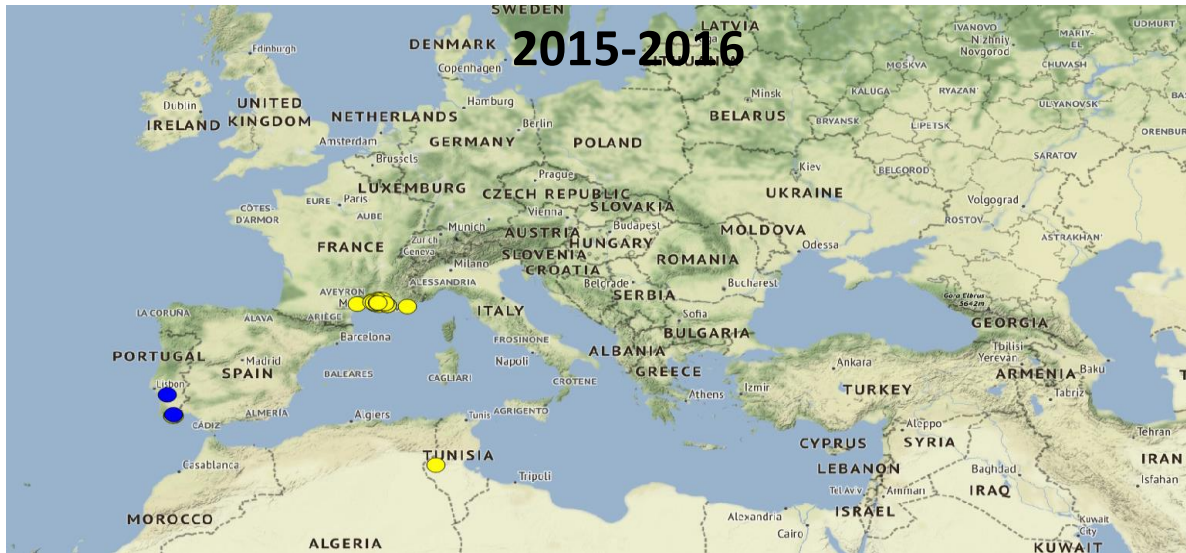
West Nile Virus: zoonosis

Transmission Cycle

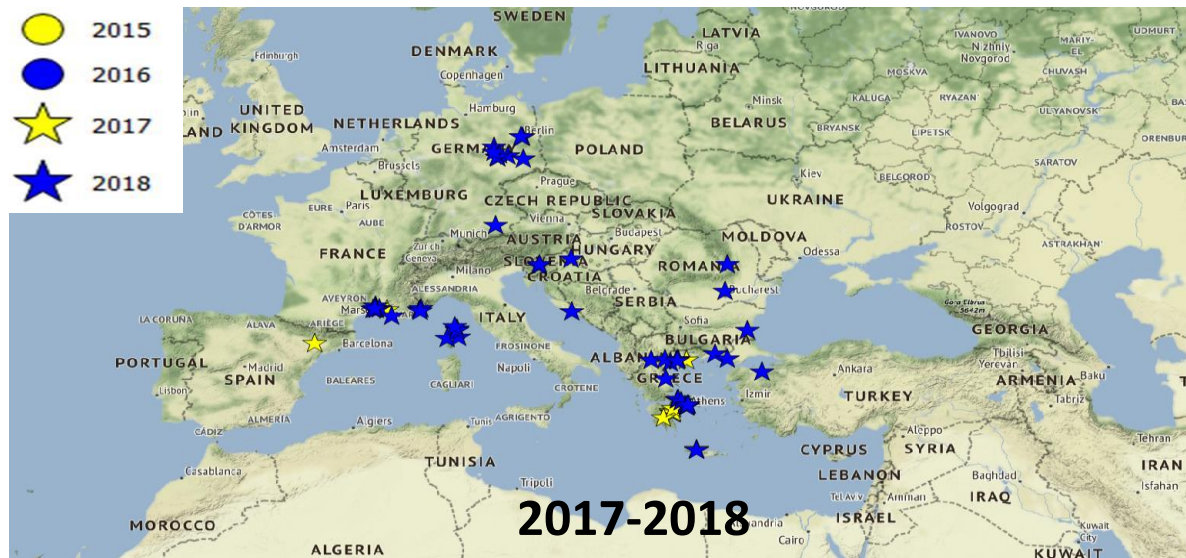


West Nile Fever

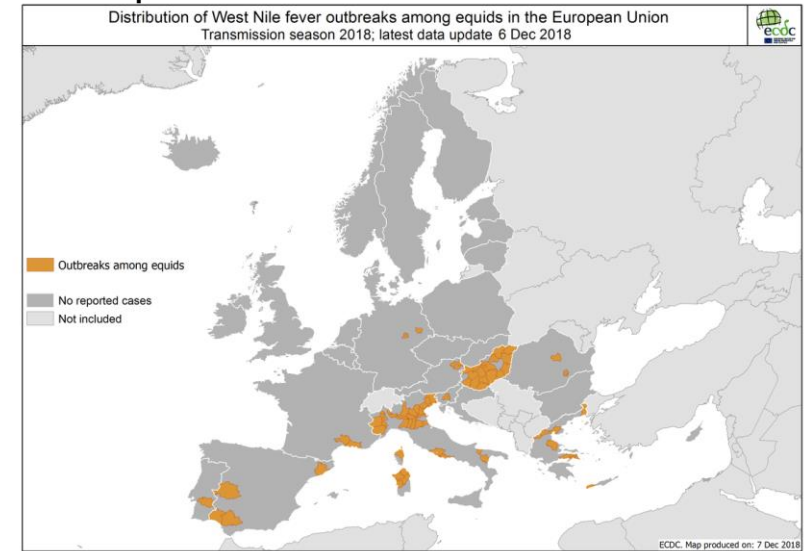
Geographical shift between 2015 and 2018



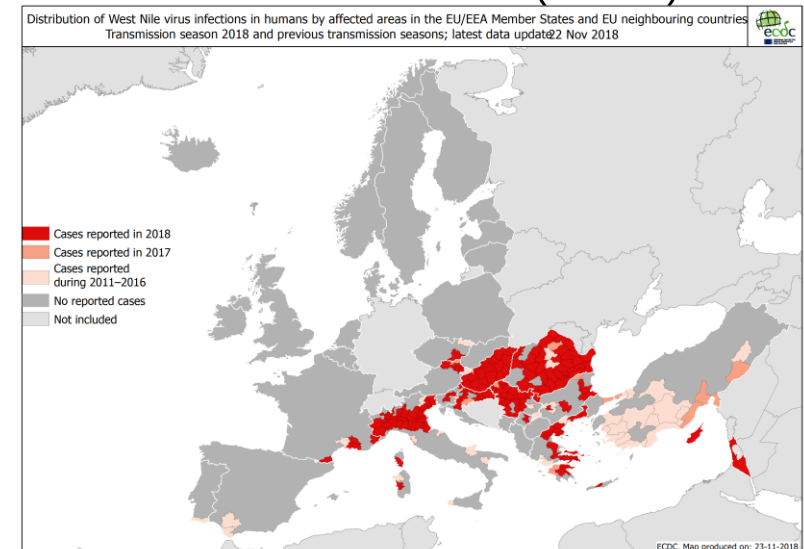
- 2015
- 2016
- ★ 2017
- ★ 2018



Equine cases 2018 (7 Dez)



Human cases 2018 (7 Dez)



West Nile Virus in Austria



Amount of positive detections 2010-2017

First case: birds of prey 08. 2008 Lower Austria

WNV detection	2010	2011	2012	2013	2014	2015	2016	2017
Humans	1	0	0	0	2	8	6	7
Horses	0	0	0	0	0	0	2	3
Birds	0	0	0	1	1	2	0	12
biting michtes - pools	0	1	1	0	2	3	2	0

Hyalomma marginatum

Detected in Austria October 2018

- „It can transmit zoonotic agents like the Crimean Congo fever virus said [Vetmeduni Wien](#) and the [Austrian Agency for Health and Food Safety \(AGES\)](#). Due to the hot summer, the parasites found suitable conditions“
- Usually in North Africa, Asia, around Mediterranean Sea
- Transmission of
 - West Nile Virus
 - Spotted Fever (Rickettsiosis)
 - Babesiosis

Gefährliche Zecke aus den Subtropen in Österreich nachgewiesen



Das ist die subtropische Zecke: Sie kann das Krim-Kongo-Fieber übertragen. © Bild: Georg Duscher / Vetmeduni Vienna

Erster Nachweis: Die *Hyalomma marginatum* kann das Krim-Kongo-Fieber-Virus übertragen.

[kurier.at](https://www.kurier.at)

Thanks

Many thanks to the persons in charge of the insect traps:



Foto: K. Brugger



Vetmeduni Vienna: K. Brugger, F. Rubel

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AGES Animal Health: NRL- IVET MOE, IVET- Linz, IVET- Innsbruck

AGES



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