

Epizootic Haemorrhagic Disease (EHD): An emerging risk in Europe



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Epizootic Haemorrhagic Disease

Infectious noncontagious disease caused by viruses belonging to the genus *Orbivirus*, which affects to wild and domestic ruminant species and is mainly transmitted by biting midges of the genus *Culicoides*.

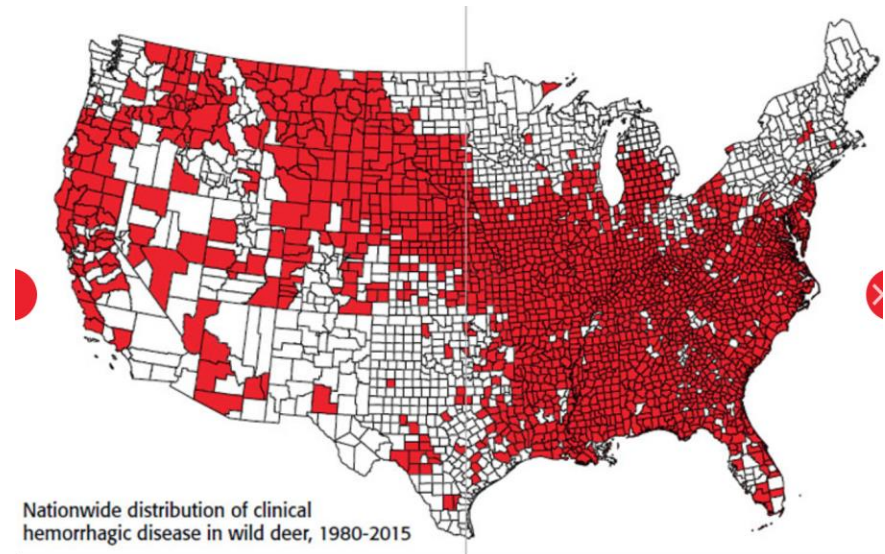


World Organisation
for Animal Health
Founded as OIE

First discovered in 1955 in New Jersey (USA)



White-tailed deer (*Odocoileus virginianus*)



Nationwide distribution of clinical
hemorrhagic disease in wild deer, 1980-2015

Etiology

Family *Sedoreoviridae*

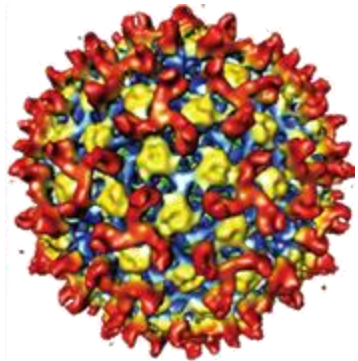
Genus *Orbivirus*

- **Epizootic haemorrhagic disease (EHDV)**
- **Bluetongue virus (BTV)**
- **African horse sickness virus (AHSV)**

7 serotypes (EHDV-1, 2 and 4-8) and other 3 putative or unknown serotypes identified to date

Variable pathogenic potential. E.g. Ibaraki virus (EHDV-2) causes high mortality (10%) in cattle in Japan

No or limited cross-reaction between serotypes



80 nm



Economic and animal health concern



World Organisation
for Animal Health
Founded as OIE

Category of listed disease D+E (Commission Implementing Regulation (EU) 2018/1882)

Reservoirs

* Host reservoirs:

* Cattle (usually asymptomatic)



* Wild ruminants (usually asymptomatic). Mortality in:

✓ White-tailed deer (*Odocoileus virginianus*) in EEUU since 1955



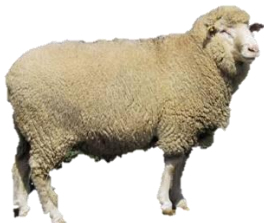
✓ Barbary deer (*Cervus elaphus Barbarus*) in Tunisia (2021-2022)



✓ Red deer (*Cervus elaphus*) in Spain (2022-2023)

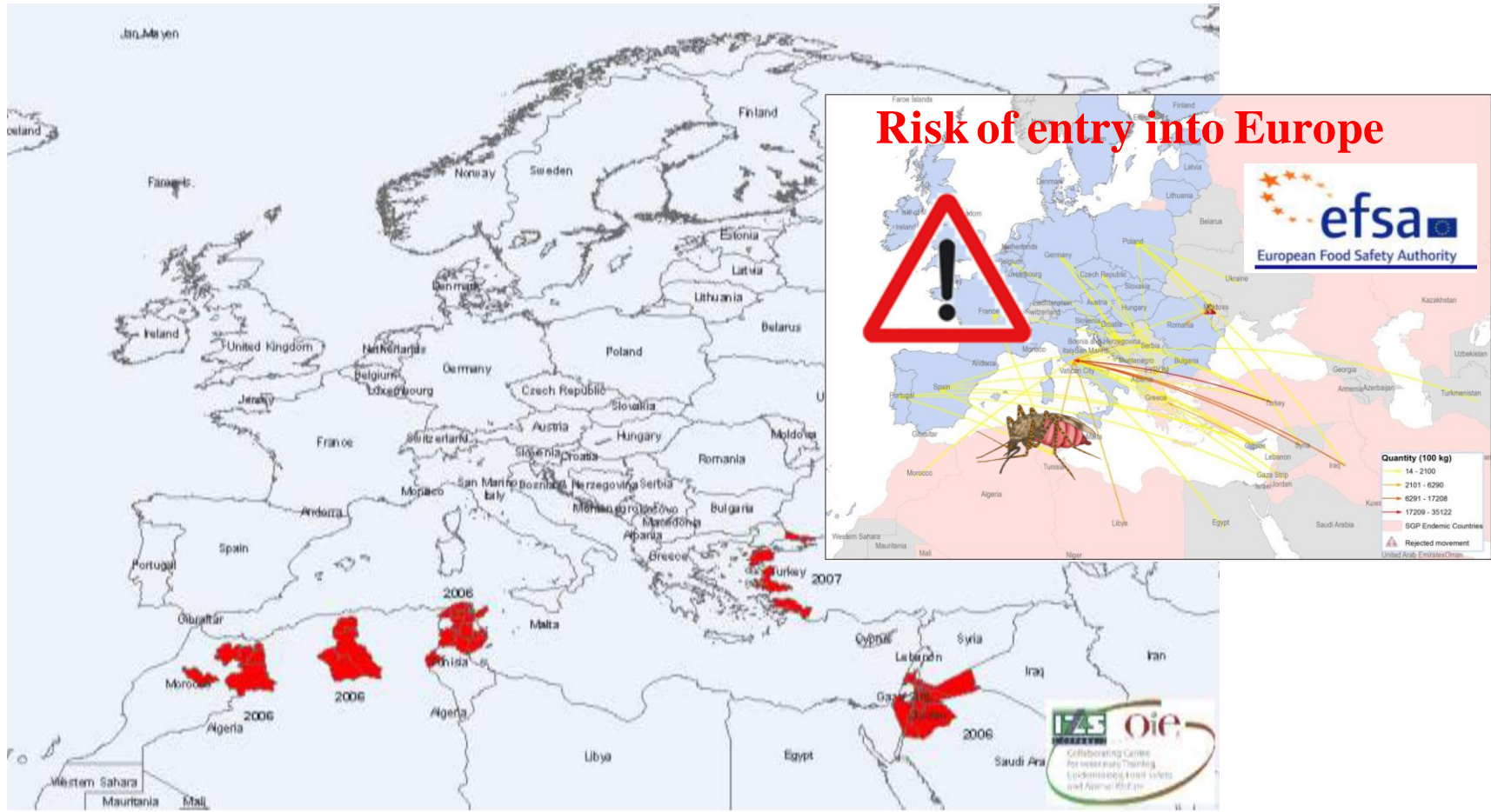


* Sheep, goat, camelids and other wild ruminant species, generally asymptomatic (cases in sheep in Turkey)



Spatio-temporal distribution before 2022

EHDV circulation in America, Australia, Asia and Africa



Outbreaks of EHDV-1, 6 and 7 in Mediterranean basin countries since 2006:

Morocco, Algeria, Tunisia, Jordan and Turkey

EHDV in Europe (2022)

The first cases detected in Sardinia on October 2022, and few days later, in Sicily.

The virus (EHDV-8) is the same to the isolated in Tunisia in 2021. This serotype had not been detected since its appearance in Australia in 1982



Firsts outbreaks in Spain on 18/11/22



Circulation of EHDV in Europe during the period 2022-2023

More than 3000 outbreaks of EHDV to date. The epidemic is still ongoing

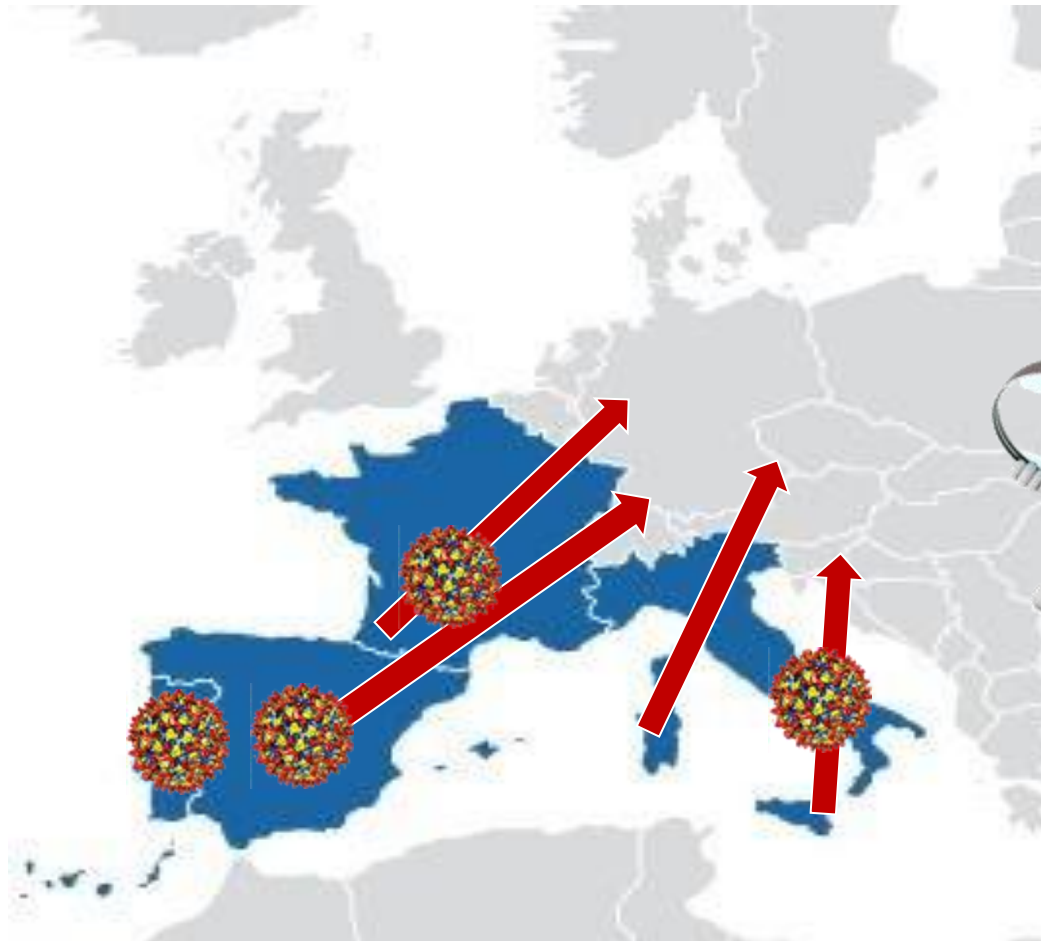
Four countries affected

- ✓ **France**
- ✓ **Italy**
- ✓ **Portugal**
- ✓ **Spain**

Animal Disease Information System (ADIS)



Food Safety



How was the virus introduced into Europe?

- Movement of infected animals
- Infected vectors?



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- Movement of infected animals
- Infected vectors?

Firsts BTV outbreaks

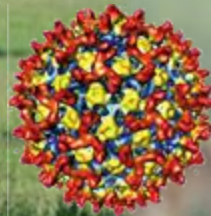


Could be EHDV circulating in Morocco?

Firsts EHDV outbreaks



EHDV circulation in Spain



Absence of information in livestock in Spain



798 wild ruminates analyzed during the period 2006-2012

Veterinary Record



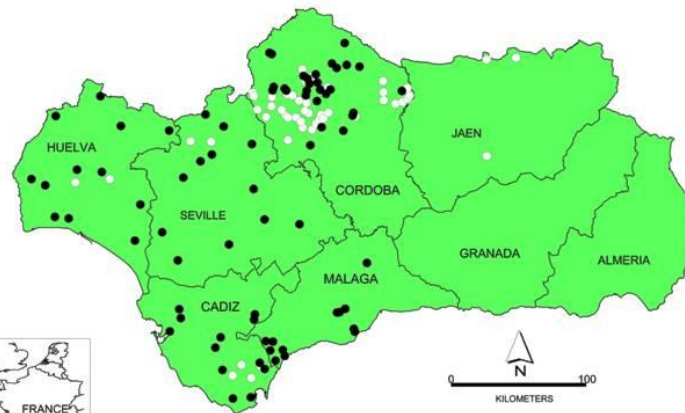
556 Red deer



214 Fallow deer



58 Roe deer



SURVEILLANCE

Serosurveillance of orbiviruses in wild cervids from Spain

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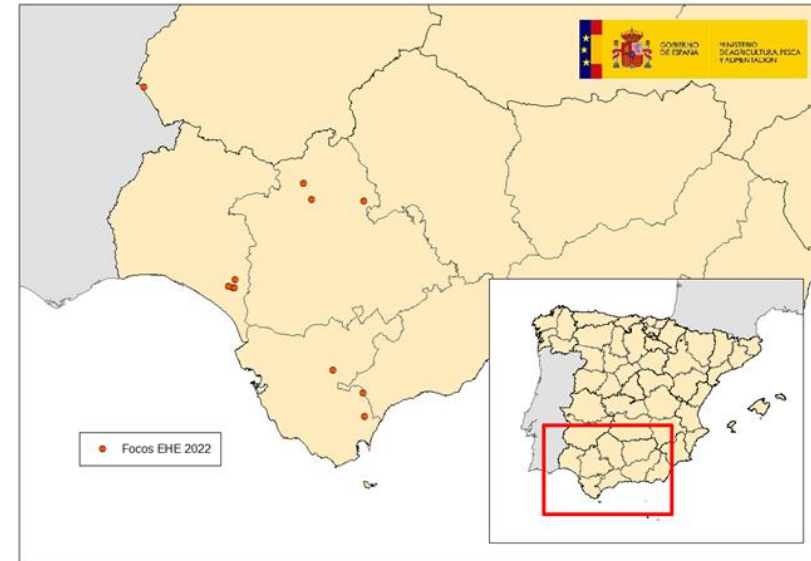
doi: 10.1136/vr.f2932

Absence of detection of antibodies in the animals analyzed during the period 2006-2012

EHDV in Spain in 2022

First outbreaks in Spain on 18/11/22

BADAJOS	1
CÁDIZ	2
HUELVA	4
MÁLAGA	1
SEVILLA	3
Total general	11



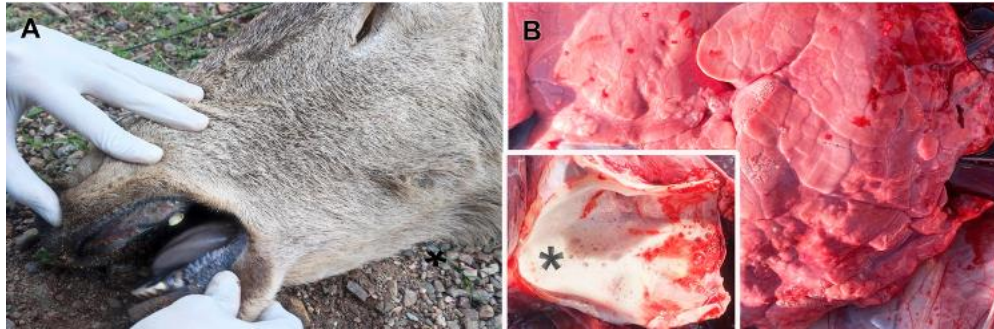
**11 outbreaks in southwestern Spain:
10 in Andalusia and 1 in Extremadura**

Mortality cases detected in red deer (*Cervus elaphus*) in Andalusia



Passive and active surveillance in wildlife

Two fatal red deer cases were confirmed, finding >99% nucleotide identity with EHDV-8 sequences from Tunisia and Italy



Antibodies in wild ruminants sampled between november 2022 and February 2023



Red deer



Fallow deer



Mouflon



ENZOEM



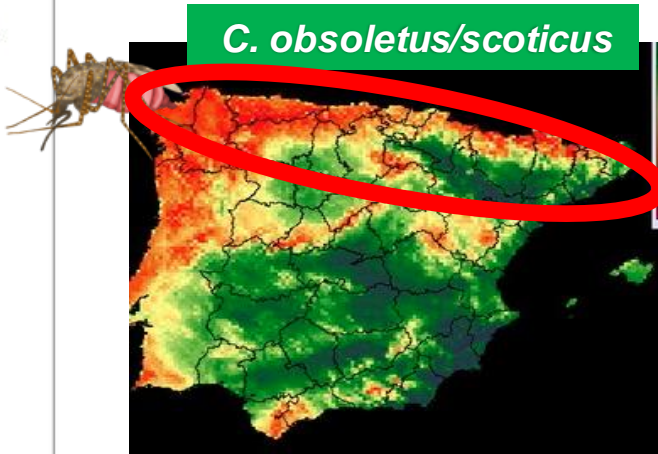
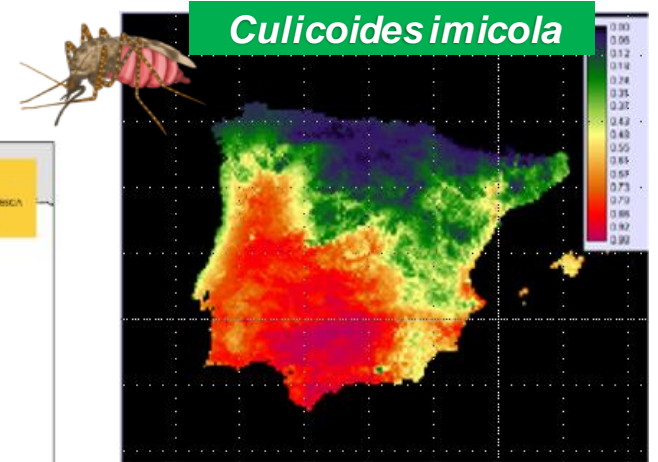
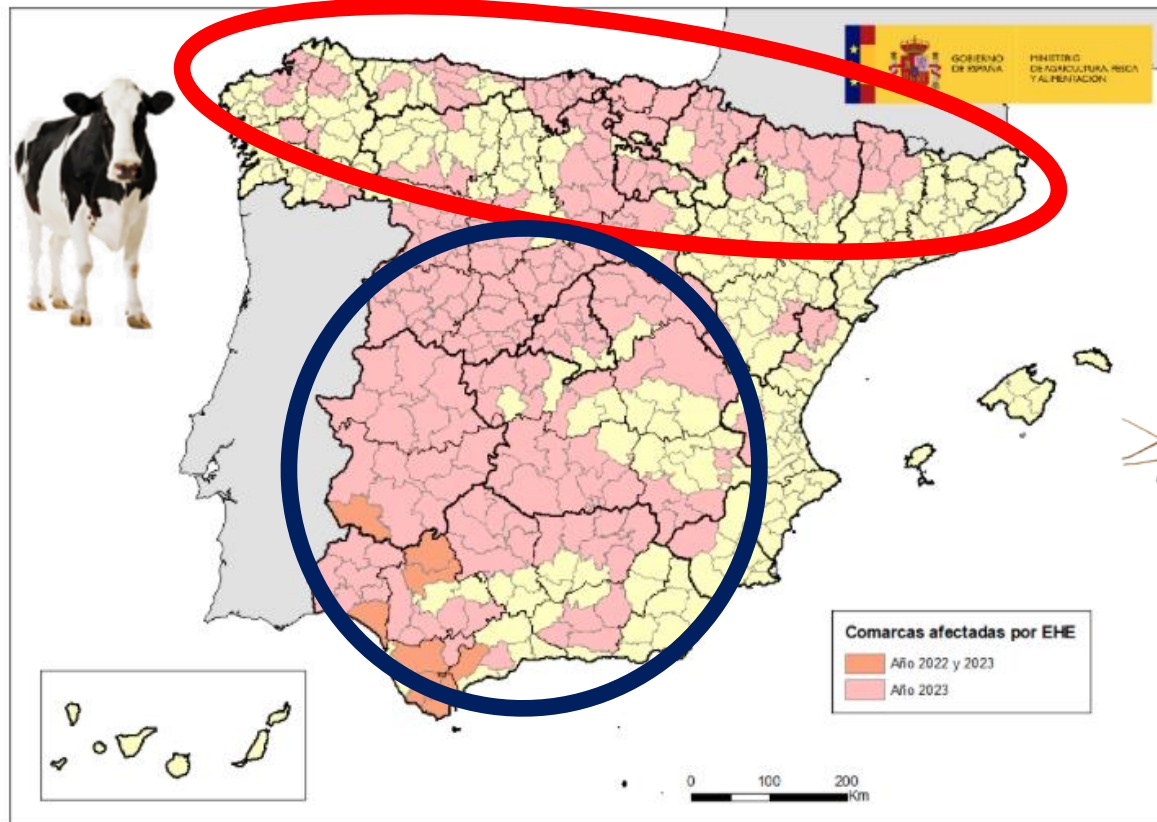
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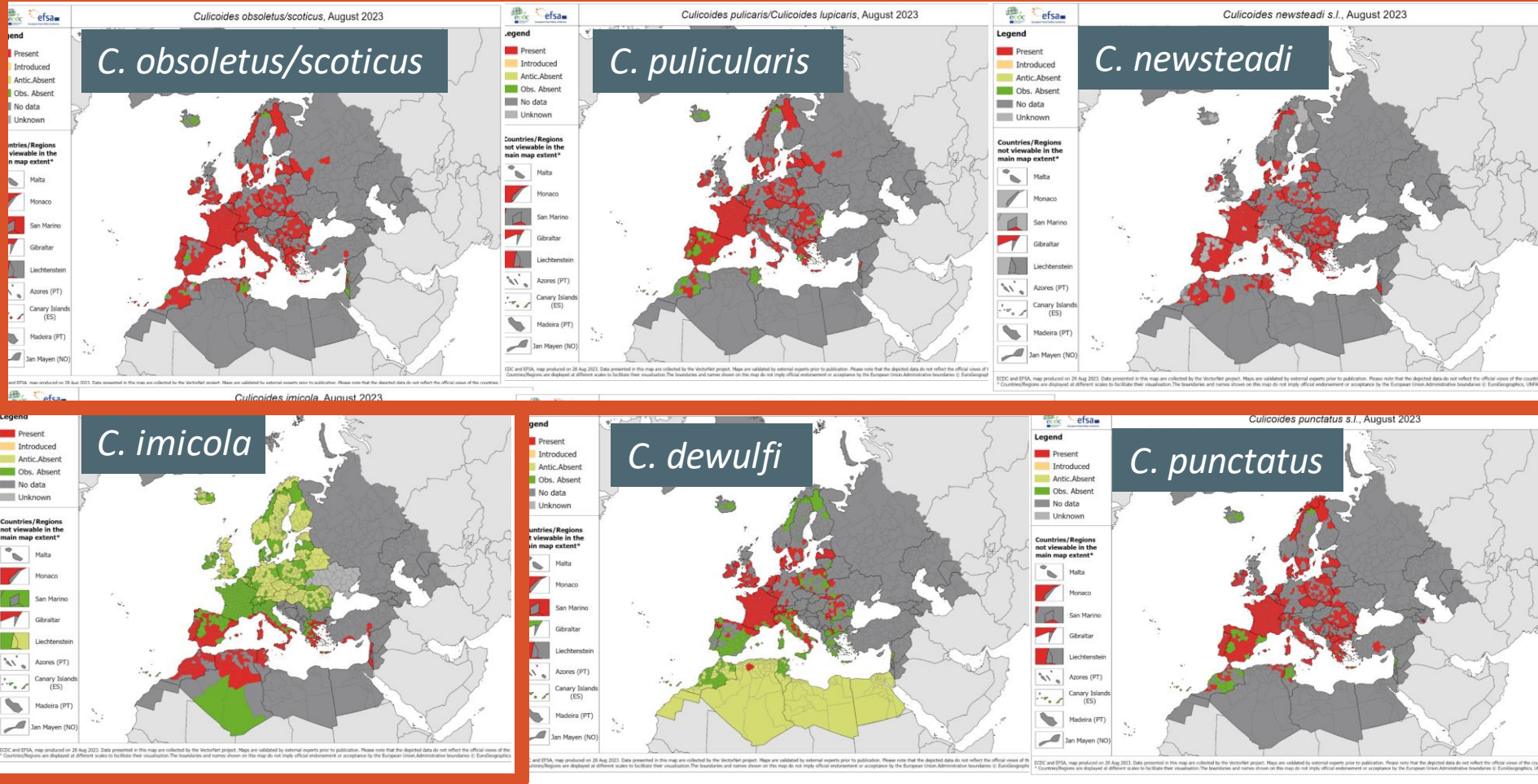
EHDV in Spain in 2023

The circulation of the virus drastically increased in 2023

- 225 affected livestock regions to date (23 outbreaks in wild ruminants).
- Widespread spatial distribution. Is the virus here to stay?
- Different *Culicoides* species may be involved.



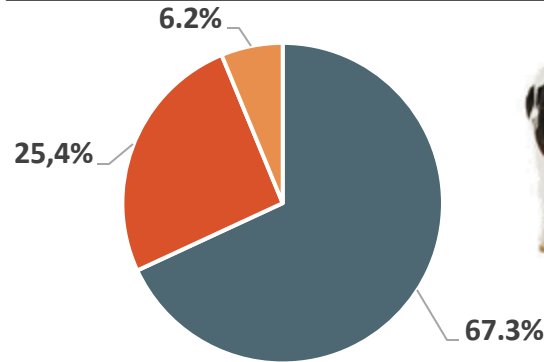
Risk of further expansion within EU Member States



EHDV-8 has been detected in *C. imicola*, *C. obsoletus/scoticus*, *C. newsteadi*, *C. pulicaris* ss in Sardinia

Surveillance in cattle

262 affected farms
(preliminary results)



■ Farmer ■ Veterinarian ■ Veterinarian/Farmer

Variable morbidity, mortality and fatality rates depending on:

- Age (> 24 months old)
- Sex (Males)
- Breed (non-rustic)
- Production system (extensive)

ENCUESTA EPIDEMIOLÓGICA SOBRE ENFERMEDAD HEMORRÁGICA EPIZOÓTICA EN BOVINO

¿Qué es la ENFERMEDAD HEMORRÁGICA EPIZOÓTICA ?

- ❖ Es una enfermedad vírica infecciosa no contagiosa transmitida por vectores (*Culicoides* spp.), que afecta a rumiantes domésticos y silvestres.
- ❖ En el ganado vacuno puede producir enfermedad clínica moderada (respiratoria, nerviosa, apatía, etc.), así como problemas reproductivos (abortos y mortinatos).



Objetivo de la encuesta:

- ❖ Recabar **información** sobre el impacto de esta enfermedad **en bovino de España**.

¿ERES GANADERO O VETERINARIO?
TU COLABORACIÓN ES IMPORTANTE!

Los datos serán analizados por:



Escanéame



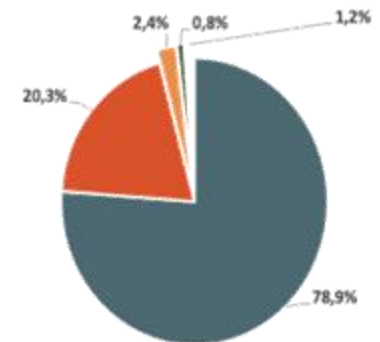
E-mail contacto: gisaz@uco.es

Age of affected animals



■ Mostly adults ■ Mostly young (< 1 year) ■ No

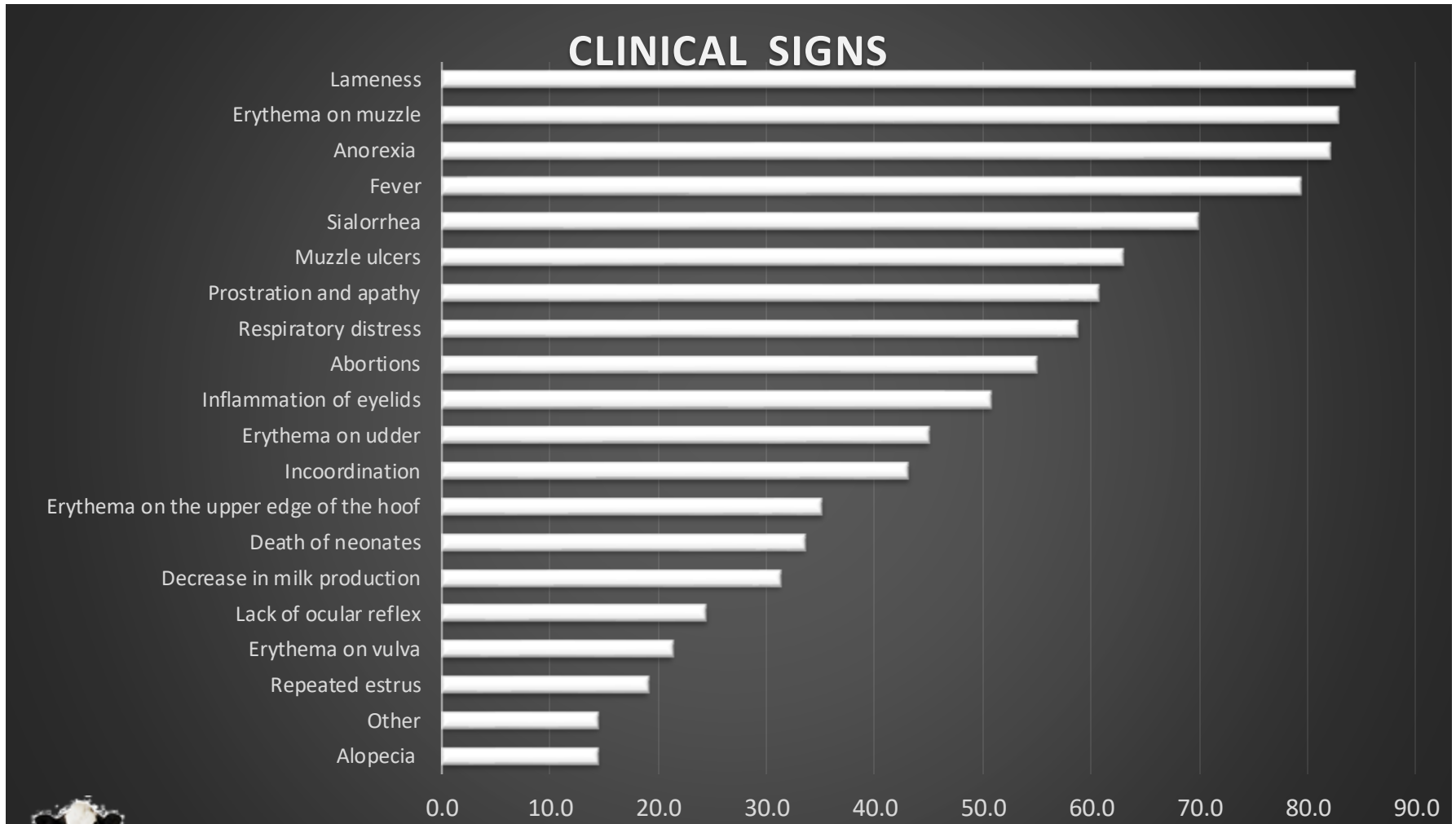
Other affected species



■ Goats ■ Deer (on the farm or in the region) ■ Sheep ■ Other



Main clinical signs and lesions by EHDV



Clinical pattern different to that observed in other serotypes or in BTV



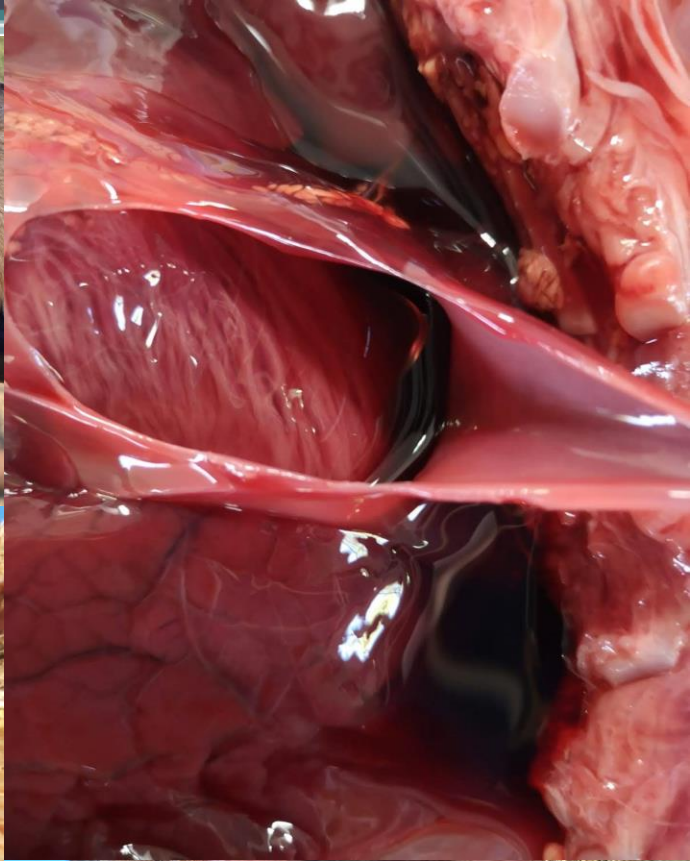
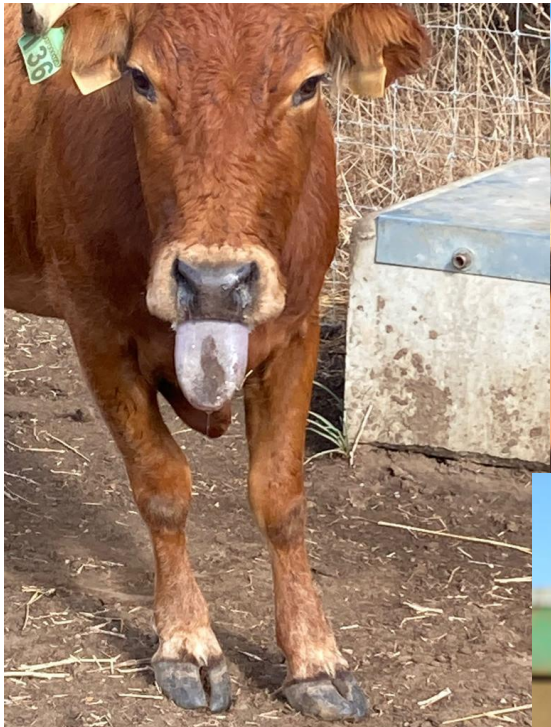
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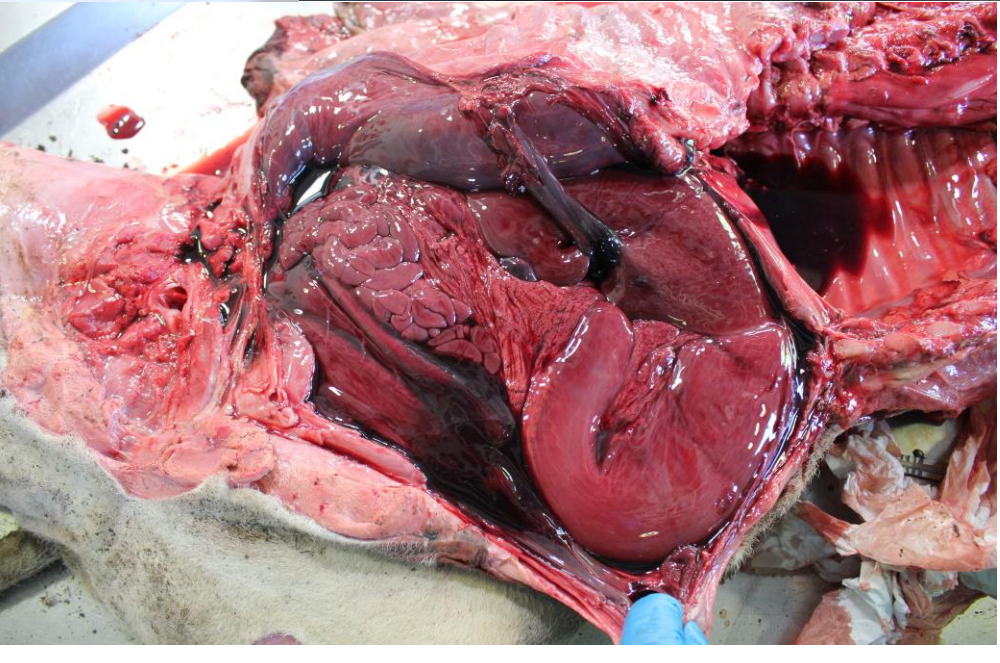
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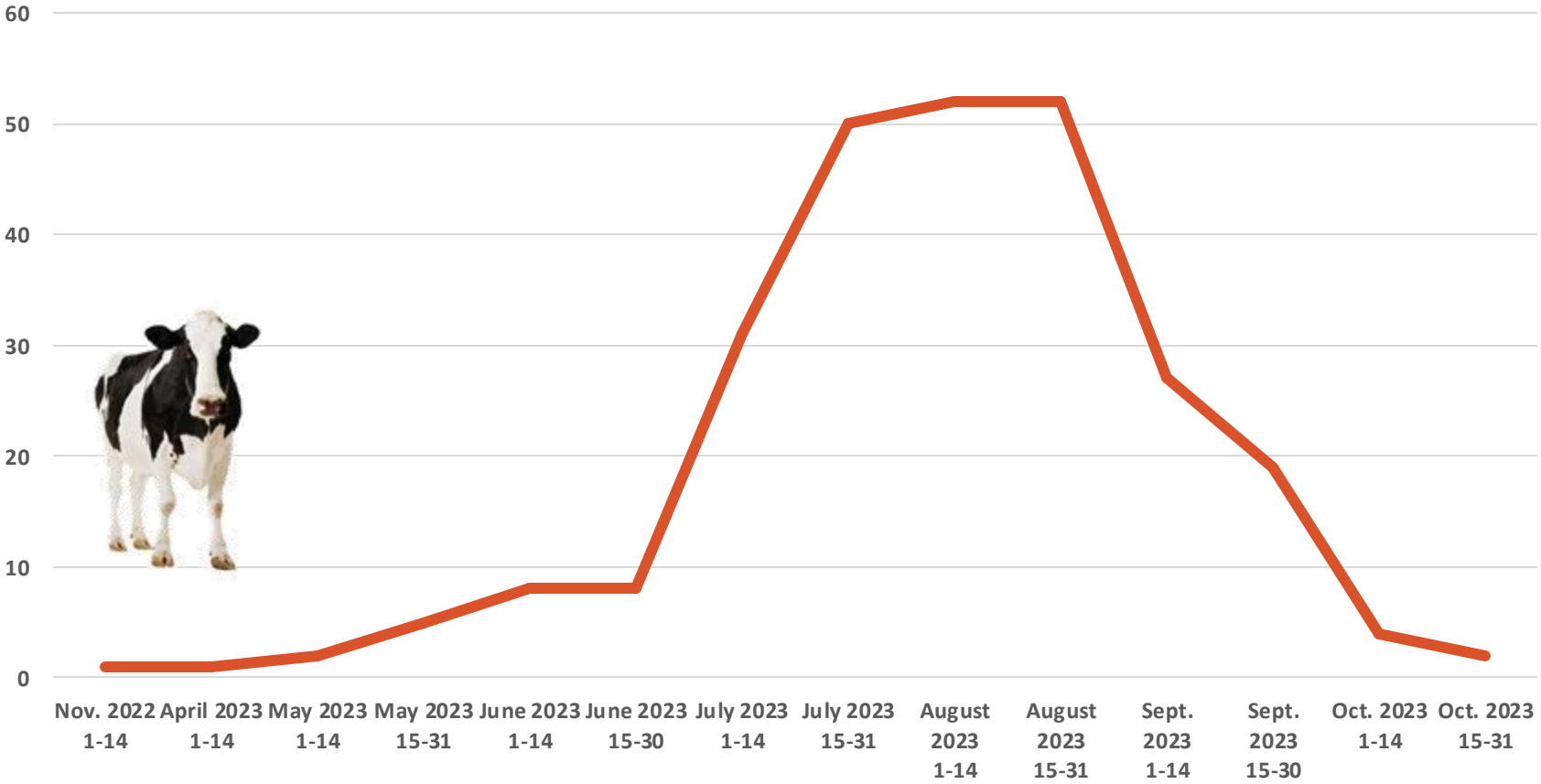
Clinical signs and lesions observed in adult animals



Reproductive disorders and lesions observed in fetuses



Spatial evolution



Most cases were observed between July and September



Surveillance in wild ruminants

- Clinical disease and mortality in European red deer in Europe.
- Virus detection in other wild ruminant species: fallow deer, roe deer,...
- Integrated wildlife monitoring is required to assess the spread and impact of EHDV-8 in these species.

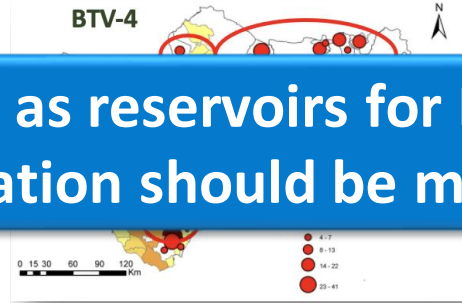


Survey of *Culicoides*-borne virus in wild ruminants in Spain

Bluetongue in wild ruminants in Spain

Wild ruminants may act as reservoirs for EHDV and, therefore, their population should be monitored

Seroprevalence values: 30-50%



Long-Term Dynamics of Bluetongue Virus in Wild Ruminants: Relationship with Outbreaks in Livestock in Spain, 2006-2011

Cristina Lanza-Ost¹, Jorge Ramón López-Olivares², Francisco Ruiz-Fons³, Pelayo Acevedo^{4*}, Ignacio García-Bocanegra⁵, Alvaro Oleaga^{6*}, Christian Gortázar⁷, Joan Pujós⁸

García-Bocanegra et al. Veterinary Research 2011, 42:88
<http://www.veterinaryresearch.oxfordjournals.org/>

VR VETERINARY RESEARCH

RESEARCH

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Role of wild ruminants in the epidemiology of bluetongue virus serotypes 1, 4 and 8 in Spain

Ignacio García-Bocanegra¹, Antonio Arsuaga-Montes¹, Cristina Lanza-Ost², Joan Pujós³, Miguel Ángel González⁴, Sebastián Nagel⁵, Félix Gómez-Gullamón⁶, Irene Zorribá⁷, Elena San Miguel⁸ and Antonio Arnaez⁹

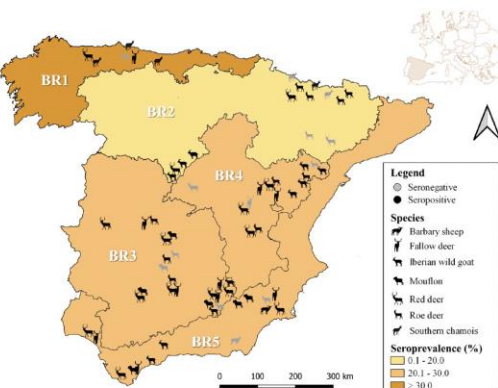
High seroprevalence in the absence of domestic reservoirs

ORIGINAL ARTICLE

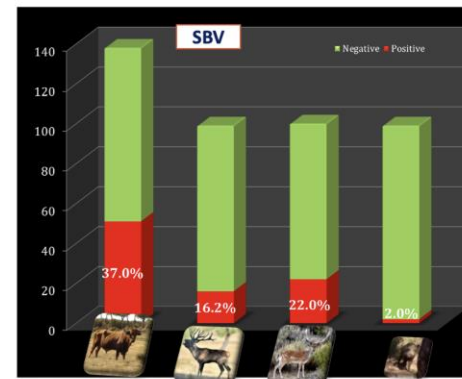
Survey of *Culicoides*-borne bluetongue and Schmallenberg viruses at the wildlife-livestock interface in Doñana National Park (Spain)

Saúl Jiménez-Ruiz^{1,2}, Joaquín Vicente³, María A. Risalde^{4,5,6}, Pelayo Acevedo⁷, David Cano-Terriza^{8,9}, David González-Barrio¹⁰, Patricia Barroso¹¹, Ignacio García-Bocanegra^{1,2}

Schmallenberg virus in wild ruminants in Spain



Variable	Category	No. positives/overall ¹	Seroprevalence (95%CI)	p-value
Species	Barbary sheep	8/36	22.2 (11.7-38.1)	< 0.001 ²
	Fallow deer	99/217	45.6 (39.1-52.3)	
	Iberian wild goat	49/246	19.9 (15.4-25.4)	
	Mouflon	33/118	28.0 (20.7-36.7)	
	Red deer	97/307	31.6 (26.7-37.0)	
	Roe deer	34/194	17.5 (12.8-23.5)	
Bioregion	Southern chamois	10/98	10.2 (5.6-17.8)	0.015 ²
	BR1	31/96	32.3 (23.8-42.2)	
	BR2	48/256	18.8 (14.4-24.0)	
	BR3	108/362	29.8 (25.4-34.7)	
	BR4	75/255	29.4 (24.2-35.3)	
Year	BR5	68/247	27.5 (22.3-33.4)	< 0.001 ²
	2010	0/20	0.0 (0.0-16.1)	
	2011	0/44	0.0 (0.0-8.0)	
	2012	60/189	31.8 (25.5-38.7)	
	2013	42/99	42.4 (33.2-52.3)	
	2014	66/175	37.7 (30.9-45.1)	
	2015	119/511	23.3 (19.8-27.1)	
2016	43/174	24.7 (18.9-31.6)		



Seroprevalence: 27%

Wispread and endemic circulation in wild ruminants in Spain

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Journal Pre-proof

ORIGINAL ARTICLE

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ORIGINAL ARTICLE

Serosurveillance of Schmallenberg virus in wild ruminants in Spain

Saúl Jiménez-Ruiz^{1,2}, María A. Risalde^{4,5,6}, Pelayo Acevedo⁷, María Cruz Arnaez⁸, Félix Gómez-Gullamón⁹, Paloma Prieto¹⁰, María José Genz¹¹, David Cano-Terriza¹², Daniel Fernández de Luco¹³, Joaquín Vicente¹⁴, Ignacio García-Bocanegra^{1,2}

Nervous signs



Loss of flight reflex



Main remarks regarding EHD

- The virus has spread rapidly in some European countries in 2023 causing significant losses in the sector. Like BTV or SBV, EHDV could spread to other countries and become endemic (overwintering) in Europe.
- Information about EHDV-8 is still scarce. Additional studies on the epidemiology, pathogenesis and effectiveness of control measures are needed to establish the real impact of this EID in Europe.
- The introduction risk of other serotypes (EHDV-6) should also be analyzed.
- Control strategies for EHDV are limited (no commercial vaccines available) and its effectiveness is often unclear.
- Integrated livestock, wildlife and vector population monitoring are required.

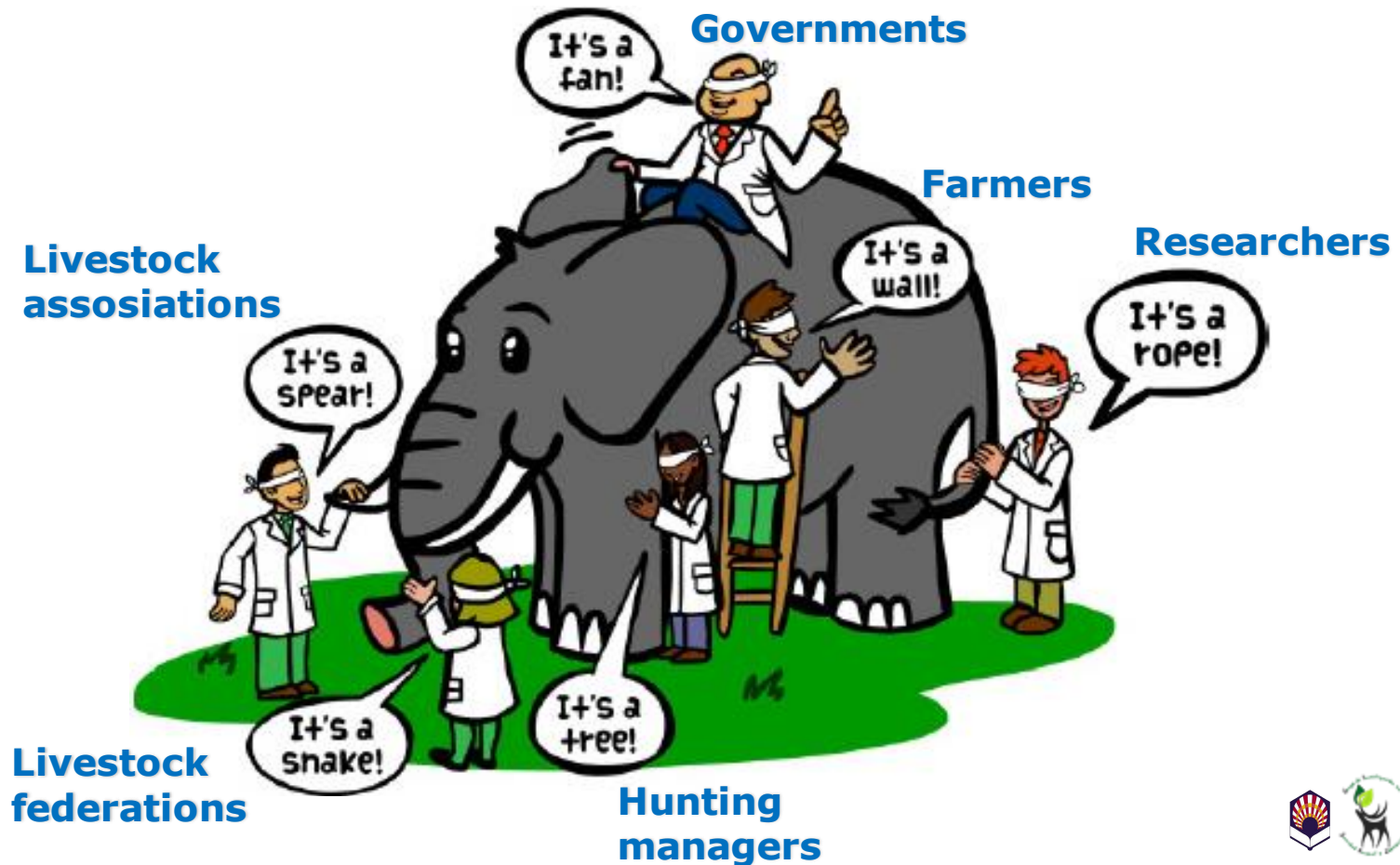


Active actions on EHD

- Systematic epidemiological data (climatic, environmental, ecological and demographic data) to develop effective control strategies.
- Development of early warning systems to help decision-makers understand where or when virus/serotypes will emerge or spread to new territories.
- Development of efficient control programmes by monitoring the density and distribution of hosts, competent vectors and serotypes.
- Adaptability of the regulations (e.g. make animal movement more flexible) to each context and scenario.
- Effective communication strategies on regional, national and European levels with the direct involvement of the livestock sector.



Multidisciplinary and active collaboration among stakeholders is needed to address comprehensively the monitoring and control of VBD with a One Health approach.



Thank you very much for your attention!!



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