CONNECTICUT

Department of Agriculture

Regulatory Services

State Veterinarian

Vectors of Veterinary Concerns

9 April 2025

Agenda

Introduction

Who am I?

What am I going to talk about?

PROVNA

WOAH

WAHIS

PROVNA

WOAH

Vectors of Veterinary Concern

Contact Information

Where to send further questions

The Usual Suspects

Ticks

Fleas

Mosquitos

Biting Midges

Introduction

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World Animal Health Organization (WOAH)

World Animal Health Information System (WASID)

Latest animal disease events

Country/Territory	Disease - genotype/serotype/subtype	Date
Belgium	Influenza A viruses of high pathogenicity (Inf. with) (non-poultry including wild birds) (2017-) H5 (N untyped)	2025/04/07
Israel	Influenza A viruses of high pathogenicity (Inf. with) (non-poultry including wild birds) (2017-) H5N8	2025/04/06
Ukraine	African swine fever virus (Inf. with)	2025/04/04
Luxembourg	Tularemia	2025/04/04
United Kingdom	High pathogenicity avian influenza viruses (poultry) (Inf. with) H5N1	2025/04/04
Ukraine	African swine fever virus (Inf. with)	2025/04/04
Luxembourg	Paenibacillus larvae (Inf. of honey bees with) (American foulbrood)	2025/04/03
Germany	Influenza A viruses of high pathogenicity (Inf. with) (non-poultry including wild birds) (2017-) H5N1	2025/04/03
Armenia	Rabies virus (Inf. with) Untyped or partially typed	2025/04/02
Armenia	Rabies virus (Inf. with) Untyped or partially typed	2025/04/02

https://wahis.woah.org/#/home

See more

*Outbreak locations were provided by the relevant Veterinary Services and may not represent the exact location of an outbreak. WOAH assumes no liability for the data displayed.

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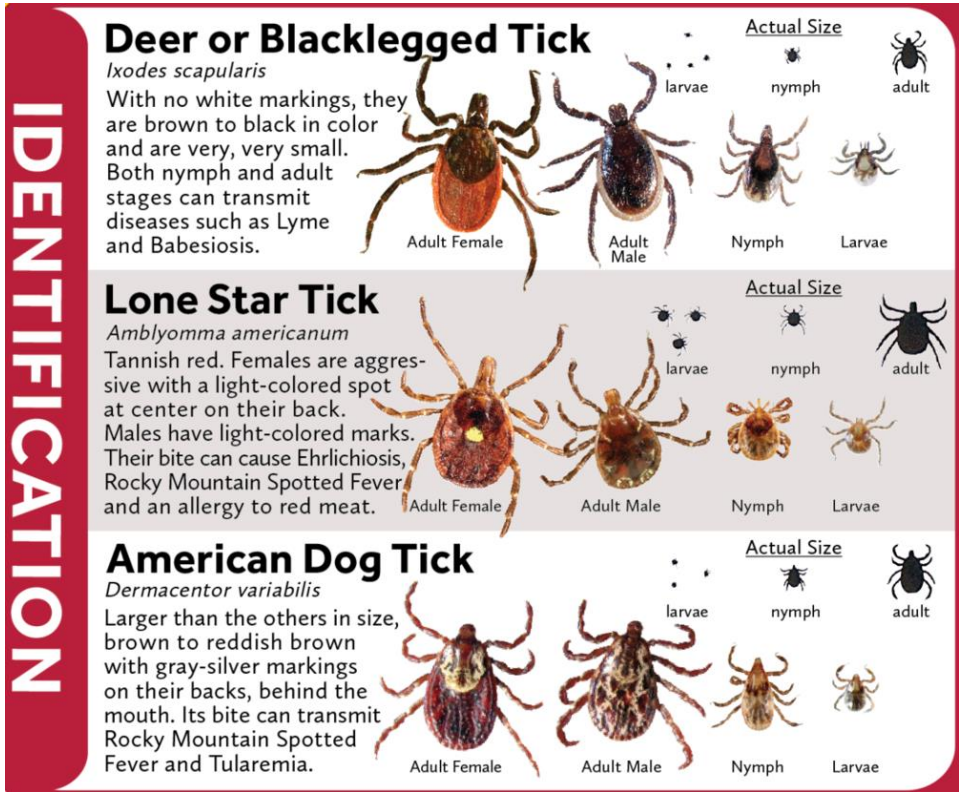
Vectors of Veterinary Concern

Of the 90 diseases of terrestrial animals currently listed by WOAH (formally the OIE), almost a third are vector-borne (entirely or for which vectors play an important role), some of which have shown a significant evolution in 2023 and early 2024.

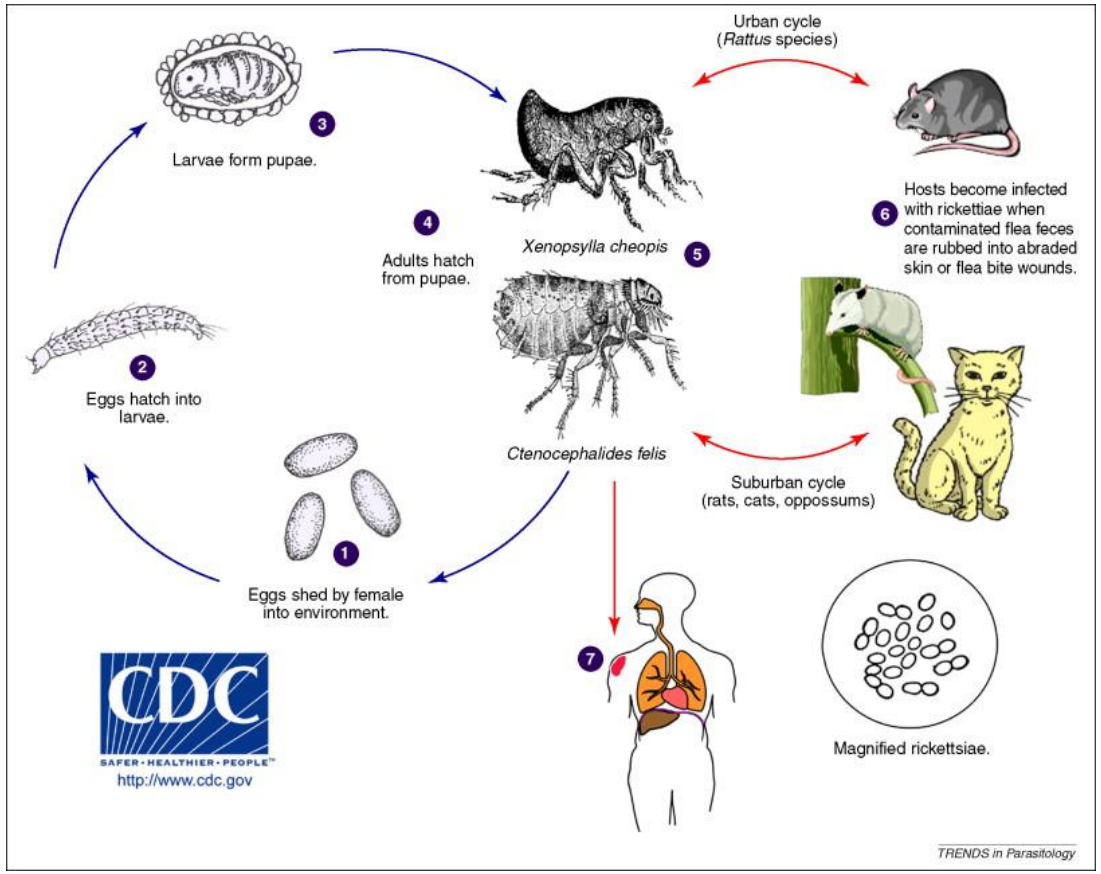
In veterinary medicine, vectors of concern are primarily blood-feeding arthropods like ticks, fleas, mosquitoes, and biting midges, which transmit pathogens causing diseases in animals.

Ticks



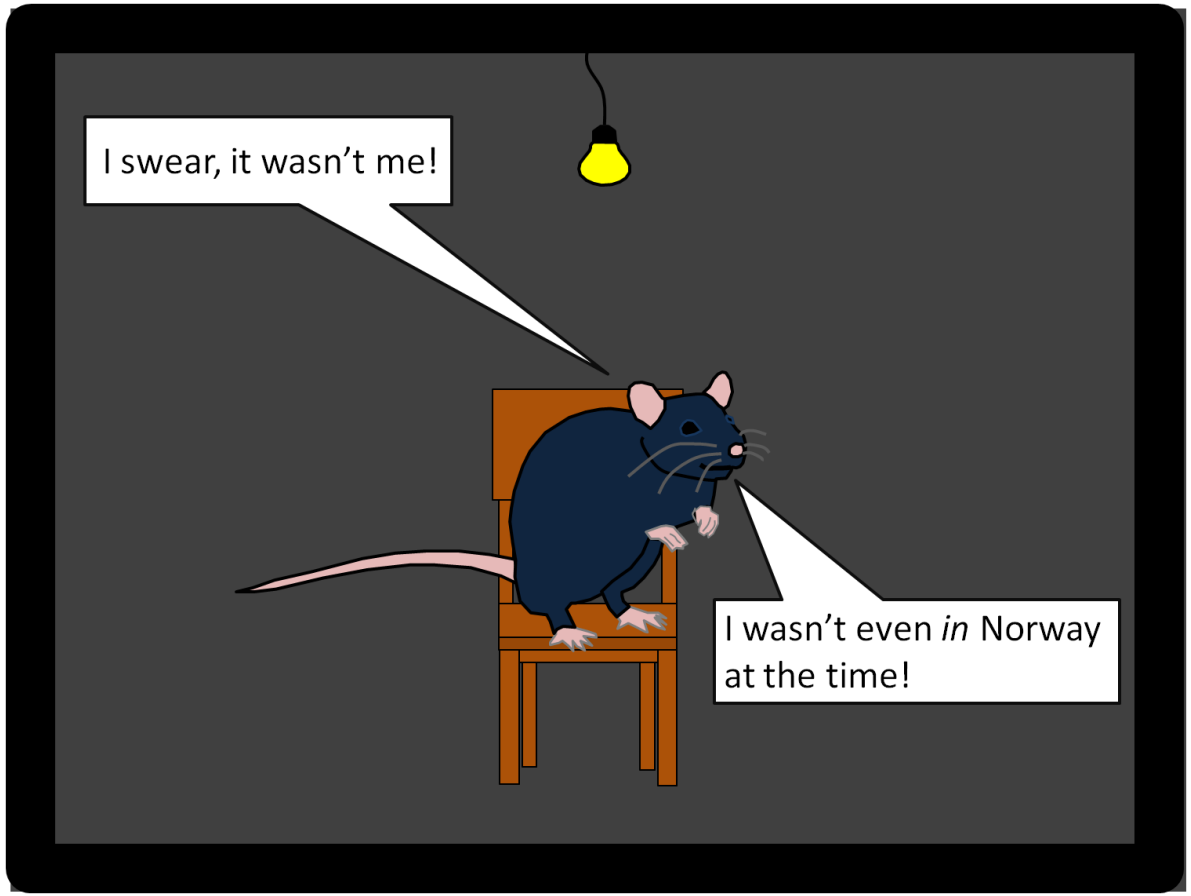
- **Ticks:**
  - Lyme disease
    - Borrelia burgdorferi
  - Babesiosis
    - Babesia spp.
      - protozoa
  - Ehrlichiosis
    - *Ehrlichia chaffeensis*, *E. ewingii*, or *E. muris eauclairensis*
  - Anaplasmosis
    - Anaplasia phagocytophilum
      - bacterium

Fleas



- **Fleas:**
  - Haemobartonella
    - *Haemobartonella felis*
      - gram-negative, epicellular parasite of feline erythrocytes
      - Now classified as Mycoplasma haemofelis
  - Plague
    - Yersinia pestis
    - First or the Justinianic (6th–8th century);
    - Second (beginning with the Black Death during c.1338–1353 and lasting until the 19th century);
    - Third (which became global in 1894)

Plague controversy

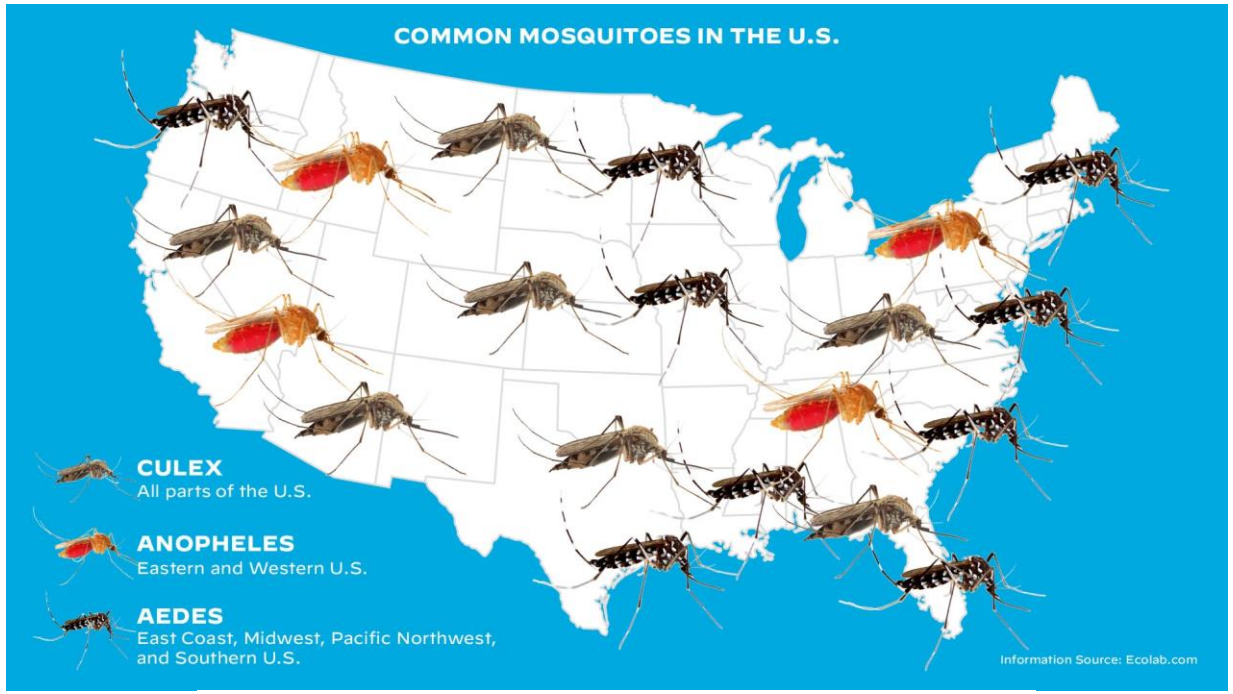


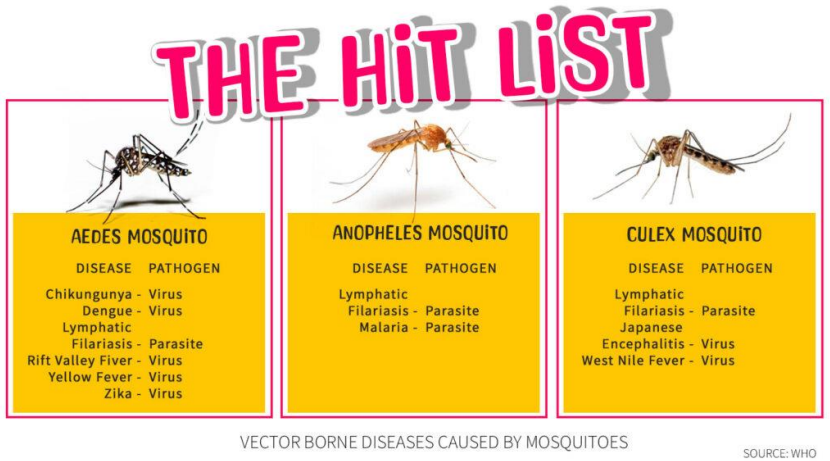
- Could have human fleas and lice been the transmitter of the Black Death?

> "found no evidence for persistent natural plague reservoirs in historical or contemporary Europe. This suggests that the plague bacterium was repeatedly introduced to Europe"

stenseth-et-al-2022-no-evidence-for-persistent-natural-plague-reservoirs-in-historical-and-modern-europe.pdf

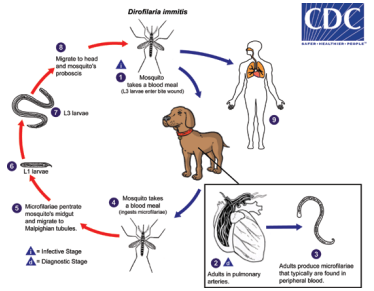
Mosquitos





VECTOR BORNE DISEASES CAUSED BY MOSQUITOES

SOURCE: WHO



- **Mosquitoes:**
  - Heartworm
  - West Nile virus
  - Eastern Encephalitis
  - Western Encephalitis

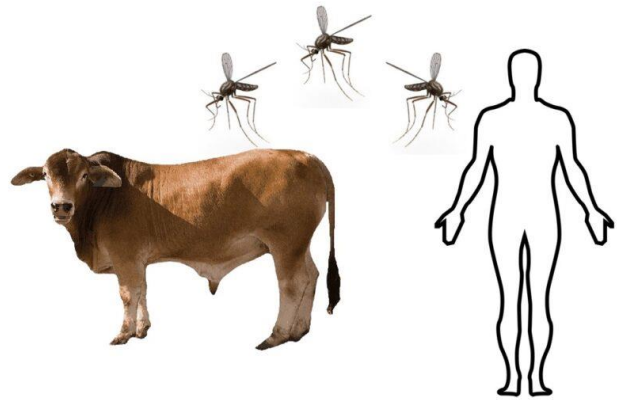
Mosquitos and Livestock

How to protect humans with animals

- Strategically positioning animals, like cattle near human populations can function as a trap to reduce the population of disease-carrying mosquitoes and hence limit the transmission of mosquito-borne diseases (MBDs).

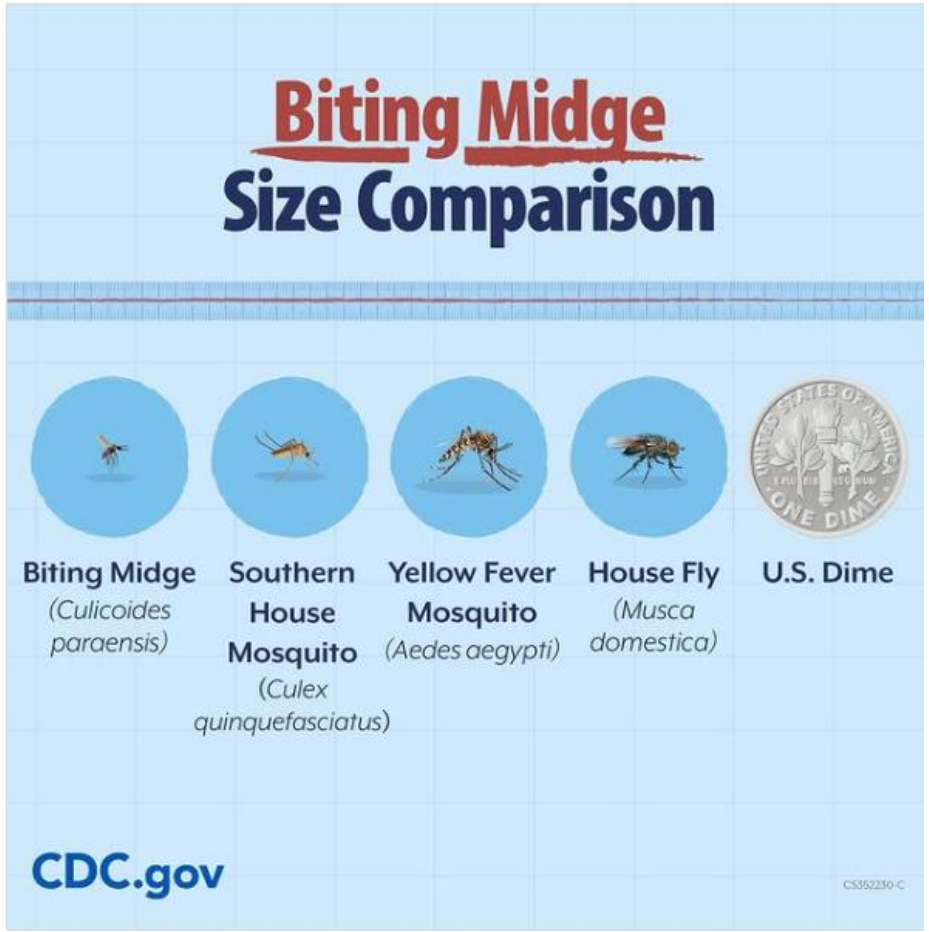
- Placing deadly traps, such as mosquito traps, near animal populations can effectively capture and kill disease-carrying mosquitoes, reducing the risk of MBD transmission.

- The use of endectocides in cattle treatment can serve as a valuable supplement to existing vector management efforts. These systemic insecticides, ingested by mosquitoes feeding on treated animals, can significantly reduce mosquito populations and prevent MBD transmission.

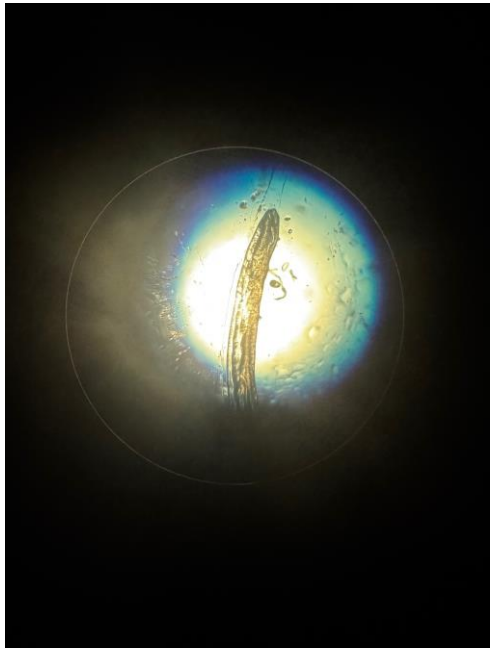


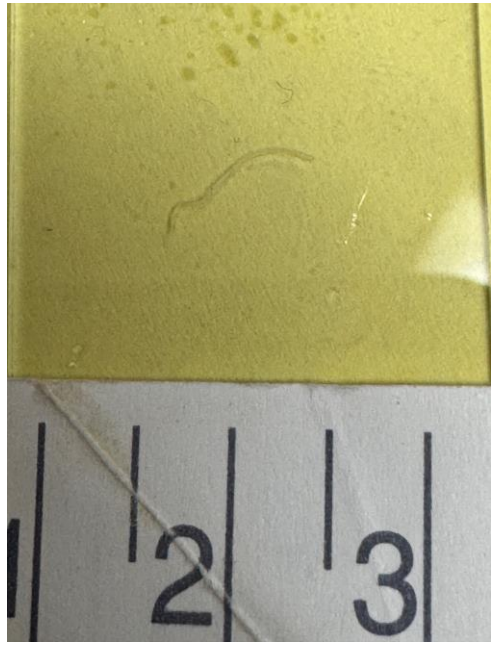
- Exploring the Impacts of Domesticated Animals on Mosquito-borne Disease Transmission - One Health and Development Initiative (OHDI)

Biting Midges



- **Biting Midges (Culicoides spp.):**
  - Bluetongue
    - Orbivirus disease
      - non-contagious disease
      - reportable disease
  - Epizootic hemorrhagic disease in cattle
    - Orbivirus disease
      - Closely related to BT
      - Non-contagious
      - reportable

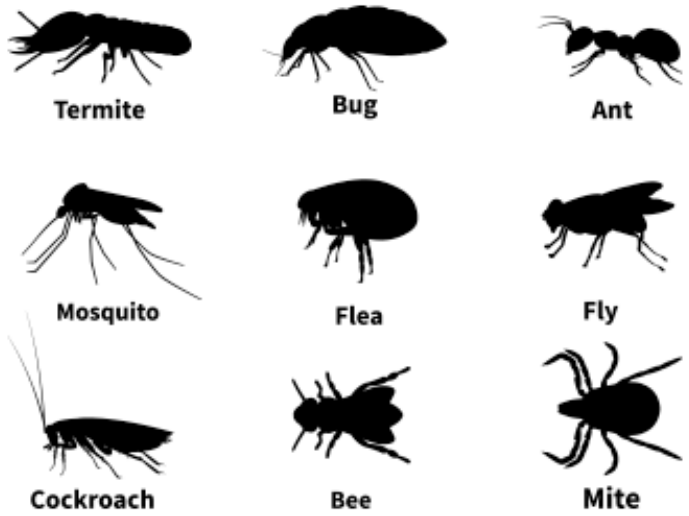


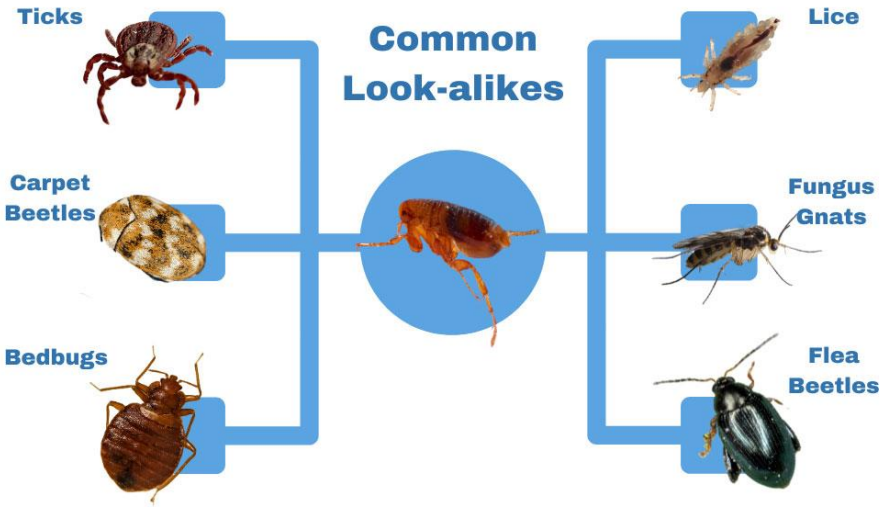


A Connecticut Oddity

- Eye Worm
  - One cat & one dog
    - Unrelated families
  - Thelazia callipaeda
  - Thelazia californiensis
    - two main species that infect
      - cats, dogs, humans
  - Filth Flies – common male house fly
  - Courtesy
    - Lynne Robbins DVM
      Wolcott Veterinary Hospital

Vectors and Large Animals





Infection with West Nile fever virus, bluetongue virus, lumpy skin disease virus and western equine encephalomyelitis virus were the most frequently reported in 2023 and early 2024, in the context of exceptional events.

Infection with lumpy skin disease virus, for which exceptional events were predominant in Asia, accounted for 144 outbreaks, making it the most reported VBD outside Europe and the Americas through early warning.

Notably, 99% of these VBD outbreaks in 2023 and early 2024 were detected in temperate regions, indicating a worrying shift in their geographical distribution.

The Honeybee & the Varroa Mite

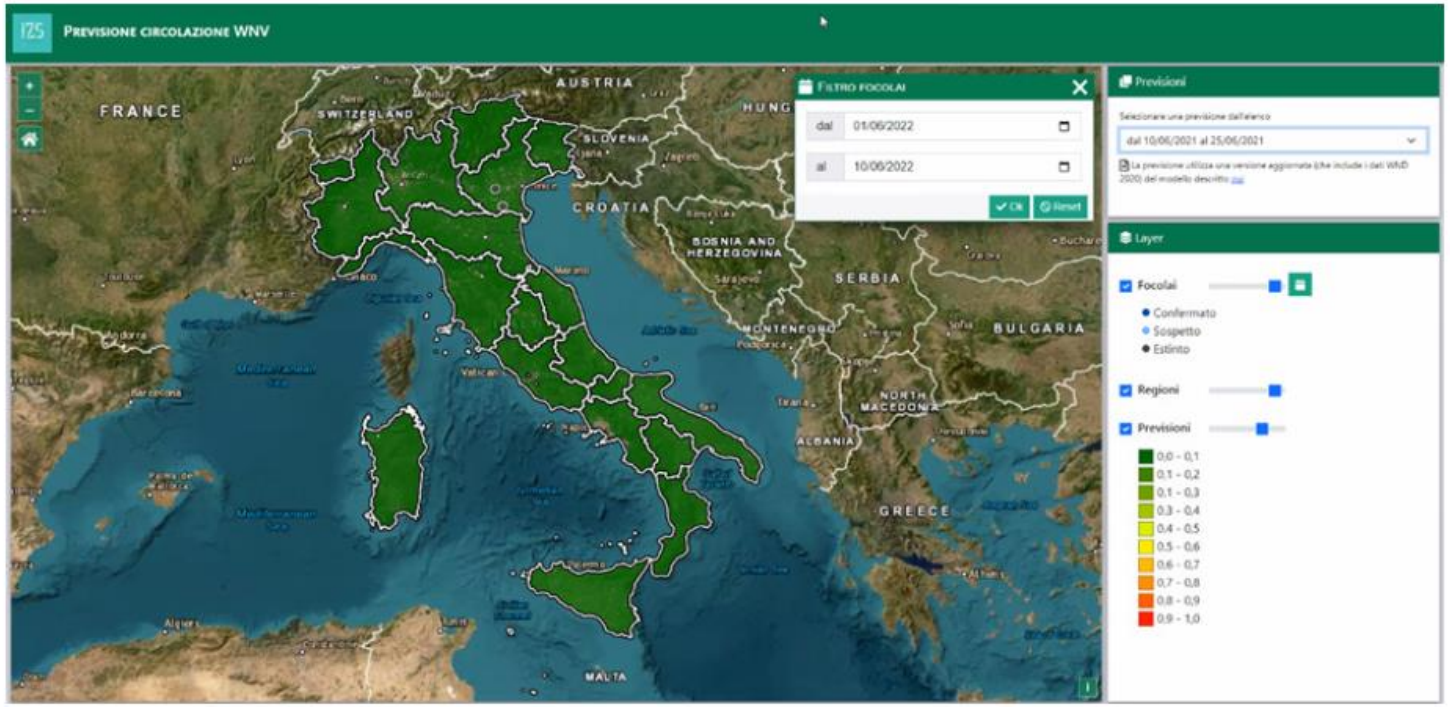
Credit: Picture from Bayer @ researchbayer.com

The Varroa mite (Varroa *destructor*)
- is an ectoparasite of the honey bee *Apis mellifera*
-L. Varroa is the most serious pest of honey bees
-inflicting more damage and higher economic costs than all other apicultural diseases.

Deformed Wing Virus (DWV):
-most prevalent and damaging virus of honeybees
-DWV can cause deformed wings, reduced lifespan,
-overall weakening of the bees, leading to colony decline.

PROVNA

The PROVNA project (“Defining Ecoregions and Prototyping on Earth Observation (EO)-based Vector-borne Disease Surveillance System for North Africa”)



Annamaria Conte and Paolo Calistri's team at IZS-Teramo have already successfully designed a tool to forecast the risks of West Nile fever in Italy, another vector-borne disease, with a 15-day prediction time. The PROVNA project aims to produce a similar model for Rift Valley fever in North Africa.

What if risk areas for vector-borne diseases could be predicted just like the weather?

In 2022, WOAH entrusted experts from Collaborating Centre for epidemiology, modeling and surveillance, IZS-Teramo

-developed an innovative prediction model for Rift Valley fever in North Africa.

- a combination of spatio-temporal data

build a prototype which should be able to predict the locations of areas at risk, and when the risk might occur.

-utilizing past conditions of temperature, rainfall and vegetation

-utilizes the past to forecast the future.

In Conclusion

Prevention & Control

A. Preventing arthropod vectors from feeding on animals is crucial for controlling vector-borne diseases.

Currently, this can be achieved year-round with repellents, insecticides, and other integrated pest management methods.

B. How is PROVNA information going to be used to help contain vector-borne diseases?

“We cannot stop the mosquitoes. However, if we know in advance when and where mosquitos are most likely to spread and potentially infect livestock, we can plan vaccination campaigns and emergency measures at the right time and place.

“**The model provides us with an efficient early-warning system, that can be associated with a contingency plan.** ”

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