

# A REGION-WIDE SURVEY IN AOSTA VALLEY FOR THE PRESENCE OF TICKS AND TICK-BORNE DISEASES



LXXI Convegno SISVet – Napoli 29.VI.2017

Zanet Stefania (1), Marlene Blanc (1), Elena Battisti (1), Anna Trisciuglio (1), Claudio Trentin (2), Marco Ragionieri (2), Ezio Ferroglio (1)  
(1) Università degli Studi di Torino, Dipartimento di Scienze Veterinarie, (2) Azienda Regionale Sanitaria USL della Valle D'Aosta

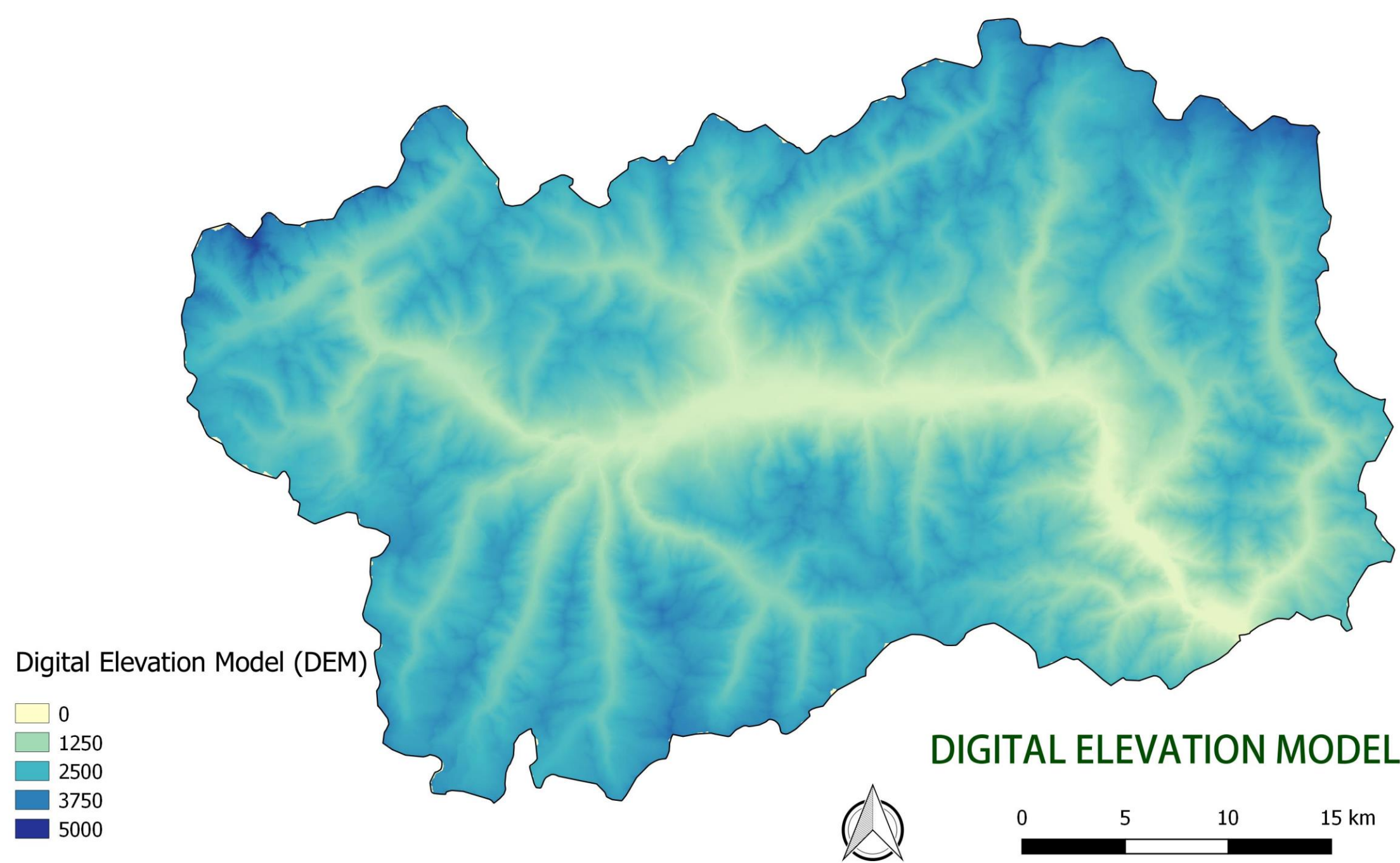
## 1. BACKGROUND AND RATIONALE OF THE STUDY

- Ticks are important vectors of many viruses, bacteria and protozoa that can cause serious infections in humans and animals.
- The epidemiology of vector-borne diseases (VBD) is rapidly changing [1] and VBD are becoming a global public health/veterinary issue that needs active surveillance [2].
- Mountain areas are preferential sites to study tick ecology as climatic conditions are exasperated and subject to more extreme changes [2]

## 2. METHODS

### 2a. Identification of sampling sites

GIS-based analysis using Q-GIS software was performed to identify suitable sampling sites on the basis of Altitude, Solar Radiance and Land Cover.



## 3. RESULTS

3a. 535 ticks were collected and identified as *Ixodes ricinus* (n=533) and *Ixodes hexagonus* (n=2)



*I. hexagonus*: 2 adults



*I. ricinus*:  
70 adults, 380 nymphs, 83 larvae

SEX: F- 25 M-19

At least one tick found in 29.41% of transects [n=10/34]  
(CI95% 16.83 – 46.17%)

Positive correlation LandCover forest  $p<0.05$   
Elevation  $p<0.01$

Negative correlation Solar radiance  $p<0.05$

*Babesia/Theileria* spp **P= 15.12; CI95% 9.05% -24.16%)**  
*Anaplasma/Ehrlichia* spp **P= 19.77%; CI95% 12.72% - 29.40%**  
MIR *A. phagocytophilum* **P=0.80%** MIR *B. capreoli* **P=3.63%**  
MIR *Cd. Neohrlichia mikurensis* **P=4.44%** MIR *B. microti-like* **P=0.40%**

## GOALS

- survey distribution and seasonal abundance of ticks in Aosta Valley (Northwestern Italy)
- analyze the collected ticks for the presence of *Babesia* spp., *Theileria* spp., *Anaplasma* spp. and *Ehrlichia* spp.

### 2b. Tick sampling

- Environmental dragging was performed monthly from May 2016 to April 2017 (12 consecutive months) in 34 locations.
- Biotic and abiotic variables were recorded at each sampling site:
  - Air and ground humidity (%)
  - Temperature (°C)
  - Vegetation coverage (canopy vs. bush, ammount)
  - Slope and aspect, elevation and slope exposure

### 2c. Species identification

Morphological identification of ticks was carried out by means of optical microscopy following keys of Manilla and Iori [4].

### 2d. Molecular detection of tick-borne pathogens

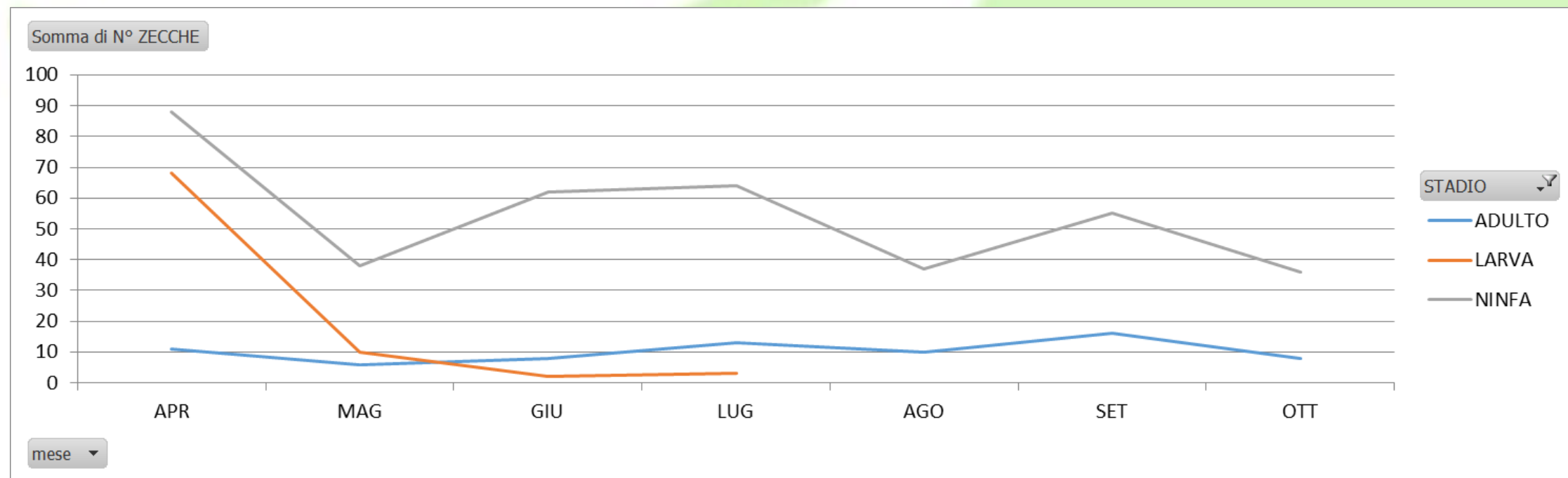
-Ticks were pooled by sampling transect, species and development stage and total genomic DNA was extracted using TRIZOL (Sigma Aldrich).

- Species-specific PCR protocols were used on pooled samples to assess Minimum Infection Rate (MIR) of:

*Babesia/Theileria* spp. [5]  
*Anaplasma/Ehrlichia* spp. [6]

- Sequencing of all PCR positive pools was performed to confirm molecular identification.

### 3b. Seasonal population dynamic



## 4. CONCLUSIONS

- Ticks and VBD wide-spread across the study area.
- Vector-borne pathogens tipically related to small mammals hosts are the most prevalent pathogens in larvae and nymphs.
- Environmental covariates are significant predictors of vector abundance
- GIS-based models can be succesfully used to predict vector and pathogen presence and abundance.

REFERENCES:  
[1] Heyman et al. A clear and present danger: tick-borne diseases in Europe. Expert Rev. Anti-Infect. Ther., 8: 33–50, 2010. [2] Mwamuye et al. Novel Rickettsia and emergent tick-borne pathogens: a molecular survey of ticks and tick-borne pathogens in Shimba Hills National Reserve, Kenya. Ticks Tick-borne Dis., 8(2): 208–218, 2017.[4] Manilla and Iori . Chiave illustrate delle zecche d'Italia. Parassitologia, 34:83-95, 1992. [5] Zanet et al. Piroplasmosis in Wildlife: Babesia and Theileria Affecting Free-Ranging Ungulates and Carnivores in the Italian Alps. Par. Vectors, 7 (1): 70, 2014. [6] Munderloh et al. Isolation of the equine granulocytic ehrlichiosis agent, *Ehrlichia equi*, in tick cell culture. J. Clin. Microbiol. 34: 664–670, 1996.