The joint risk score for vector-borne diseases used for early detection

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Acknowledgements This project is financed within the EMIDA program of ERA-NET. EF and CF were partially financed by the Ministry of Economic Affairs of the Netherlands (BO-20-509-509) General Direction for Food (DGAl) of the French Ministry of Agriculture, RESPE, IFCE-SIRE and CIRAD cordially provided the data for the EEV example.

Belief of an on-going outbreak

Numbers + survival + temporal patterns + establishment

Transmission

Evidence from syndromes

P(intro) x P(transmission) x P(evidence) = P(on-going) x P(evidence)= P(on-going | evidence)

Example Equine Encephalosis Virus (EEV) in France

EEV is an exotic mild disease of horses transmitted by Culicoides. Neurological and respiratory syndromes are used as evidence EEV. Here we show the use in two weeks with a simulated outbreak starting in week 28.

Joint Risk Score

Example Using JRS to reduce time until first detection of Bluetongue Virus (BTV) in Germany

BTV is a viral disease of ruminants which was introduced in Germany, The Netherlands and Belgium in 2007. The JRS using mortality in cattle was compared in a simulation with surveillance in sentinel herds.

Conclusions

• The Joint Risk Score is an intuitive method to combine prior beliefs on an on-going outbreak with field data
• Information on introduction probability of EEV makes the JRS more accurate than evidence from respiratory and neurological syndromes alone.
• The Joint Risk Score based only on mortality in cattle and average transmission probabilities lacks power of discernment for early detection of BTV in Germany

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Date of first detection compared between the JRS and normal surveillance with design prevalences of 5%, 2%, 1% and 0.5%. JRS1 takes 200 districts with highest risk JRS the 20 districts with highest risk.