



Disease-modeling as a tool for surveillance, foresight and control of exotic vector borne diseases in the Nordic countries

Bødker, Rene

Publication date:
2011

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Bødker, R. (2011). Disease-modeling as a tool for surveillance, foresight and control of exotic vector borne diseases in the Nordic countries. Abstract from Transmission of human and animal infections: effects of climate, ecology and preventive actions, St. Raphaël, France, .

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Disease-modeling as a tool for surveillance, foresight and control of exotic vector borne diseases in the Nordic countries

René Bødker^a

rebo@vet.dtu.dk

^aNational Veterinary Institute, Bülowsvej 27, 1790 Copenhagen V., Denmark

Modeling the potential transmission intensity of insect borne diseases with climate driven R_0 process models is frequently used to assess the potential for veterinary and human infections to become established in non endemic areas. Models are often based on mean temperatures of an arbitrary time period e.g. a monthly temperature mean. Average monthly temperatures are likely to be suitable for predicting permanent establishment of presently exotic diseases. But mean temperatures may not predict the true potential for local spread or limited outbreaks resulting from accidental introductions in years with temporary periods of warm weather. This is particular true for the relatively cool Nordic countries where periods of suitable temperatures, the 'windows of opportunity for transmission', may be very short and only appear in odd years

DTU-Veterinary Institute is developing a system for continuous risk assessment of the potential for local spread of exotic insect borne diseases of veterinary and human importance. In this system R_0 -models for various vector borne diseases are continuously updated with spatial temperature data to quantify the present risk of autochthonous cases ($R_0 > 0$) and the present risk of epidemics ($R_0 > 1$) should an infected vector or host be introduced to the area. The continuously updated risk assessment maps function as an early warning system allowing authorities and industry to increase awareness and preventive measures when R_0 raises above the level of 'no possible transmission' and target costly active serological surveillance to these limited periods of potential risk, thus dramatically reducing the number of samples collected and analysed. The risk estimated from the R_0 modelling may be combined with the risk of introduction from neighbouring countries and trading partners to generate a truly risk based surveillance system for insect borne diseases.

We have also used the R_0 models to predict the potential impact of climate change on four selected vector borne disease: Bluetongue in cattle, African Horse Sickness in horses, *Dirofilariasis* in dogs and *Vivax-malaria* in humans. Both the presently very restricted potential spatial and seasonal distribution was predicted to increase in the coming 50 years. While the predicted new areas potentially affected by vector borne diseases are relatively small they closely follow the spatial distribution of human habitation and agriculture. The practical impact of climate change on human health and agriculture may therefore be greater than simple distribution maps suggest.

This presentation will demonstrate the system for selected vector borne diseases, compare the predicted R_0 with the actual spread of bluetongue in Scandinavia i 2008, and discuss the level of preventive measures needed to prevent large scale epidemics in the future.