

Use of monthly collected milk yields for the detection of vector borne emerging diseases: a simulation based approach

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Two vector borne diseases, caused by the bluetongue and Schmallenberg viruses, have emerged in the European cattle population during the past 10 years resulting in high costs for the industry. The emergence of such diseases cannot be predicted, and the mitigation of their impact can rely on an early detection. A decrease of milk production is a non specific symptom associated with some diseases that can be incorporated in an early detection system. Cow milk yield is routinely collected on a monthly basis as part of the different milk recording schemes available throughout Europe. The aim of this project was to evaluate the ability of a space-time scan statistic to detect in real time the emergence of a vector borne disease through the simulation of its propagation and effects on milk production. Milk recording data collected in France between 2003 and 2006 were available. The years 2003 to 2005, before the bluetongue virus outbreak, were used to determine expected milk productions in the absence of disease. A range of plausible patterns of spread (speed of propagation, daily proportion of cows affected within a herd) and effects (rate and duration of decrease in milk production) were used to simulate the spatio-temporal propagation of a disease and its effects on the milk productions observed in 2006. Disease simulation was performed in R. Clusters of deviations from the expected yields were detected at the municipality-week level using SaTScan. The ability and timeliness of a space-time scan statistic to detect a disease emergence according to its propagation characteristics and impact on milk production will be presented.