GEOGRAPHICAL REPORTING AND ANALYSIS OF INFECTIOUS ANIMAL DISEASE OCCURRENCE IN THAILAND AND NEW ZEALAND

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Abstract

A comprehensive geographical study and reporting system is presented. Animal disease data from both Thailand and New Zealand were explored and analysed using spatial analysis methods. The particular technique used depended on the form of the data, aim of the investigation and the epidemiology of the disease of interest. Results and methods from some of these analyses were then included in the development of *a simple geographical disease reporting and analysis system for Thailand*.

A number of methods were used to investigate the presence of temporal clustering, spatial clustering and spatio-temporal clustering of foot and mouth disease (FMD) reporting data in Thailand during January 1995 to May 1997. Temporal clustering in the time series of individual districts and individual provinces was found in many districts and provinces. Some of these provinces also showed the evidence of unimodal patterns. Spatial clustering was detected both at the district and province level. Space-time clustering was found at the district level.

An exploratory analytical approach was used to investigate spatial clustering of bovine leukaemia virus (BLV) infection in New Zealand dairy herds. Two spatial clusters of BLV positive herds were detected in the Bay of Plenty area (p =0.001) and in the northern part of the South Island (p = 0.082). We recommend that further investigations be conducted to define possible reasons for the presence of these observed clusters.

The geographical patterns of FMD were described and risk maps of FMD outbreak occurrence in Thailand were developed using logistic regression and classification tree models (CART). The potential impact of spatial autocorrelation on the logistic regression models was assessed. CART models incorporating cost-sensitivity were constructed to develop sets of decision rules for the likelihood of FMD outbreak occurrence. Receiver-operating characteristic (ROC) curves were used to quantify and compare the value of the different models for production of risk maps and to provide a method for decision makers allowing them to optimise sensitivity and specificity of binary decision criteria.

A simple geographical disease reporting and analysis system for Thailand was developed using the GIS software ArcView 3.1®, the database management software Microsoft Access 97® and the spatial cluster analysis software SaTScan® version 2.1.3.

The programming language Avenue™ which is part of ArcView 3.1 was used bind the different components using a common user interface. The system allows quick and easy production of custom maps for routine reporting as the system is largely automated and requires only basic computer skills from the operator.

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