Development of a syndromic surveillance system to enhance early detection of emerging and re-emerging epizootics and zoonoses

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Key words
Animal health data, algorithms, syndromic surveillance, livestock, retrospective analysis, disease outbreaks

Aim of the study
The overall aim of the project is to contribute to the development of a national system for the early detection of emerging and re-emerging animal and zoonotic diseases in Switzerland by evaluating the potential of available animal health data for syndromic surveillance, and by developing pattern recognition algorithms to produce alerts when such pre-selected events occur more often than expected by chance.

Material and methods
Different sources of syndromic data available for livestock in Switzerland were screened for potential syndromic indicators: mortality data reported by farmers to the national cattle registry (Tierverkehrsdatenbank); mortality data collected by rendering plants (Centravo); meat inspection data from slaughterhouses (FLEKO and Marmy); and clinical data reported by veterinary practitioners (Equinella). Descriptive analyses of the different data sets were carried out. Methods to exploit data on mortalities, abortions, meat inspection results, data from rendering plants etc. were developed and aberration detecting algorithms were tested. Algorithms were evaluated in terms of sensitivity, specificity and timeliness and validated through outbreak simulations.

Results and significance
One of the main outputs of this project was an inventory of health-related data available for livestock in Switzerland, including information e.g. on availability, coverage or timeliness of syndromic indicators. Gaps in the data sets or the underlying database were identified (e.g. lack of centralised data on partial carcass condemnations at slaughter) and possible improvements, that might need to be addressed for a future integration of these data into a national surveillance system, were discussed (e.g. increasing the frequency with which cantonal veterinary services send meat inspection data to FLEKO). These results provide a basis for decision makers to better focusing limited resources in veterinary public health and improving exploitation of available animal health data.
Finally, in close collaboration with the potential implementing bodies of a Swiss livestock syndromic surveillance system, solutions for technical implementations of algorithms in existing databases for real-time screening as well as a framework for evaluating such a system have been discussed. This project serves as a stepping stone towards bridging the gaps between the Swiss animal health main stakeholders and encouraging the exchange of ideas on how to improve Switzerland's capacity for disease surveillance and management through the harmonisation of data collection procedure and the development of database linkages for example.
A detailed final report by Flavie Vial will be delivered to BLV.

Publications, posters and presentations
A list of publications, posters and presentations is provided in a separate document.

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