

Vaccination concepts for the control of highly contagious animal diseases as part of the Swiss animal health strategy

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Key words

FMD, CSF, BT, HPAI, NCD, Animal disease control, Vaccination strategy, Cost-benefit analyses

Aim of the study

The aim of the project was to provide a basis for decision-making for the control of the highly contagious animal diseases FMD, CSF, HPAI, NCD and of BT by elaborating scientific syntheses on the epidemiological, economical and socio-ethical aspects of disease control.

Material and methods

The focus of this project was on the modeling and comparison of different control strategies against BT, CSF and FMD. The economical and socio-ethical aspects of disease control were covered in separate projects (1.08.09, 1.09.05). A deterministic model was set up to predict the BT incidence dynamics on farm level using a temperature dependent infection rate. The model parameters were estimated with data of farms in BT virus serotype 8 (BTV8) affected regions in Germany. The estimated parameters were used in a vaccination model, together with Swiss farm animal population and temperature data stratified by altitude level. A spatially explicit stochastic simulation model based on contacts between farms was used to estimate the effect of several control parameters on outbreaks of CSF and FMD in Switzerland. Several vaccination and pre-emptive culling strategies and different starting time points of vaccination within an outbreak were simulated.

Results and significance

The results of the simulations showed that during the outbreak of BTV8 in a naïve population, vaccination can reduce the size of the epidemic by up to 98%. In a population without re-introduction of the virus, eradication of the disease by vaccination is possible. However, if annually a new infection is introduced into the population from outside, vaccination cannot fully protect the population. The results indicate that the epidemiological situation and the control measures taken in neighboring countries have an essential impact on the success of the eradication. For CSF, the simulations showed that the basic control strategies are sufficient and different vaccination strategies as well as ring culling alone or in combination with vaccination have no advantages regarding the size and duration of an outbreak. Also in the case of FMD, the simulations showed that in Switzerland an emergency vaccination in the beginning of an outbreak has no advantages compared to the basic control strategy alone. The findings of these studies serve as a basis for the implementation of several performance goals of the Swiss animal health strategy 2010+ and, particularly, for an optimal contingency planning for highly contagious animal diseases.

Publications, posters and presentations (Formatvorlage Überschrift 2)

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