DIAGNOSTIC NEEDS FOR DIFFERENT REGIONS AND STAGES OF FOOT AND MOUTH DISEASE CONTROL

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The diagnostic needs for FMD control will vary. In some cases virus detection will be required, in other cases antibody detection. It is, however, essential to be prepared. Quantitative knowledge about the samples size, sensitivity and specificity of the test is therefore important.

For the FMD contingency plan in the Netherlands we developed a stochastic FMD transmission model to evaluate control measures in both densely and sparsely populated livestock areas in the Netherlands. The model contained a within herd transmission model based on published experimental data from transmission experiments, and experimental data on recognition of clinical signs. The between herd transmission model was based on the relation between probability of infection and distance to a known infection source based on the 2001 FMD outbreak in the Netherlands and the exact locations of Dutch cattle, sheep and pig farms. The model takes differences between animal species (cattle, sheep and pigs) into account. The effect of vaccination, as determined in animal experiments, is included at the individual level, making a comparison between control strategies possible at the livestock area level. The results for individual animals indicate how many infected animals escape clinical detection during the epidemic (i.e. undetected minor outbreaks), enabling a comparison between different scenarios for final screening.

Our model results show that the minimal control measures required by the EU are sufficient in sparsely populated livestock areas (approximately 2 farms per km^2), but ring culling or vaccination can be used to curb epidemics in densely populated livestock areas (>3 farms per km^2). The maximum number of samples submitted for viral detection, either by virus isolation or RT-PCR, depend on the maximum number of infected farms, which can be over 2000 farms if the outbreak starts in a densely populated livestock area. The total number of serum samples to be tested in the final screening depends on the control strategy and screening strategy. The number can be low if contiguous culling in a 1 km radius is applied (45 000 samples), but can be very high when the standard EU control measures are used with extended screening in the surveillance zone (> 1.5 million samples). Compared to standard EU control measures, the total number of non-detected infected ruminants in a densely populated livestock area is lower when vaccination is used, due to the fact that the outbreak is better contained.

The Dutch example shows that modelling is an essential tool for contingency planning. The model used should take into account the possibility that even in unvaccinated populations infected ruminants can be missed in the final screening. The outcome of our model shows that the risk can be lower when emergency vaccination is used in a densely populated livestock area, and therefore the increased time to regain freedom without vaccination mentioned in the OIE *code* is not fully risk based.