Quantitative decision making in animal health surveillance: Bovine Tuberculosis Surveillance in Belgium as case study

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Abstract

Introduction: Despite eradication and control measures applied across Europe, bovine tuberculosis (bTB) remains a constant threat. In Belgium, after several years of bTB disease freedom status, routine movement testing, as currently practiced, revealed itself inadequate to detect some sporadic breakdown herds. The aim of this study was to strike the balance between cost and effectiveness of different surveillance system components to identify sustainable alternatives for early detection and substantiation of freedom of bTB while maintaining acceptance of these amongst the different animal health stakeholders. Methods: Stochastic iteration model was built to simulate, first, the expected current surveillance system performance in terms of sensitivity and specificity of detection. These results were then descriptively compared to observed field results. Secondly, the cost and effectiveness of simulated alternative surveillance components were quantified. To measure impact of key assumptions (i.e. regarding diagnostic tests and true prevalence), sensitivity analysis was performed. Results: Discrepancies between the predicted and observed performance of bTB surveillance in Belgium were observed. Secondly, simulated alternatives revealed that targeted IFN-γ as well serological testing with Antibody ELISA towards risk herds would enable increasing the overall cost and effectiveness of the Belgian bTB surveillance system. Sensitivity analysis showed that results remained constant despite modification of some key assumptions. Discussion: Performance of current bTB surveillance system performance in Belgium was questionable. This exercise highlighted that not only sensitivity, but specificity is a key driver for surveillance performance. The quantitative and participative conceptual framework revealed itself a useful tool to allow evidence-based decision making regarding future tuberculosis surveillance in Belgium, as required by the international standards.

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