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A DYNAMIC SIMULATION MODEL FOR COST-BENEFIT ANALYSIS OF PARATUBERCULOSIS CONTROL STRATEGIES IN DAIRY FARMS

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Efforts to reduce prevalence and consequences of paratuberculosis can be jeopardised if farmers don't enrol in control programmes. For these decision-makers, the expected efficiency of the programme in the situation of their own farm is paramount. Moreover, methods to assess the balance between costs of the programme and expected benefits should account for the goals and constraints of the farm management. The objective of this study was to evaluate the costs and benefits of control programmes in infected dairy herds, taking into account the production goal and the constraints on replacement resulting from management of mastitis and infertility that can be high when these disorders are frequent. A stochastic dynamic herd model was developed and simulated. Assumptions for transmission of *Mycobacterium avium paratuberculosis* (Map) were based on an epidemiological model where transmission can result from either a contaminated environment of the calf, or in *utero* contamination. Herd dynamics and management were detailed to simulate decisions and all inputs and outputs and to calculate the gross margin. Different scenarios of Map control were simulated (surveillance and culling of clinically affected animals or systematic test-and-cull, improving hygiene of calf rearing) and compared to a do-nothing scenario. A sensitivity analysis was carried out with high or low levels of mastitis and infertility. When culling for infertility or mastitis was high, the Map control programme resulted in an annual herd milk yield much lower than the production goal of the farmer, and in reduced gross margin for all scenarios. When it was low, several scenarios of Map control were profitable after 7 to 13 years. This model shows that the efficiency of Map control can be reduced. It enables to identify the conditions for positive return on investment in a variety of production contexts representative of goals and constraints of dairy farms. Integrating the overall farm management when assessing Map control programmes provides results more likely to be accepted by farmers.