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To minimize the impact of a Classical Swine Fever (CSF) epidemic on both economics and animal welfare an effective control strategy is essential. Due to the development of a marker vaccine, emergency vaccination can be considered as an alternative to preemptive culling. In this paper, we will assess the effectivity of such a control strategy, using mathematical modelling. The transmission of the virus is described on distinct levels of individual, farm and national scale. Experimental data of transmission experiments and data that were collected during the outbreak of CSF in the Netherlands in 1997/1998 serve to calibrate the models. In this way, the effect of vaccination of individual animals can be studied on a larger scale. Four control strategies are evaluated for the situation of the Netherlands in 1997. It was found that 1 km ring vaccination is less effective than 1 km ring culling, while 2 km and 3 km ring vaccination limit both the duration and size of the outbreak considerably. The multilevel character enables the model to evaluate a large range of scenarios and thus aid decision making.