

QUANTITATIVE RISK ASSESSMENT REGARDING THE IMPORT OF MARKER-VACCINATED ANIMALS

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Background

- Vaccines used in veterinary medicine, in many cases, only prevent clinical signs but cannot prevent infection
- Marker vaccines: DIVA strategies (= differentiate infected from vaccinated animals)
- For Aujeszky's disease (AD) and Infectious bovine rhinotracheitis (IBR), marker vaccines are already used in disease control programmes
- Change in public perception: slaughter policies become difficult to justify and vaccination policies become more attractive

Aim of the study

- Conduct a risk assessment regarding the hypothetical import of marker-vaccinated animals into Switzerland using stochastic modelling
- Provide decision makers with recommendations for future import scenarios

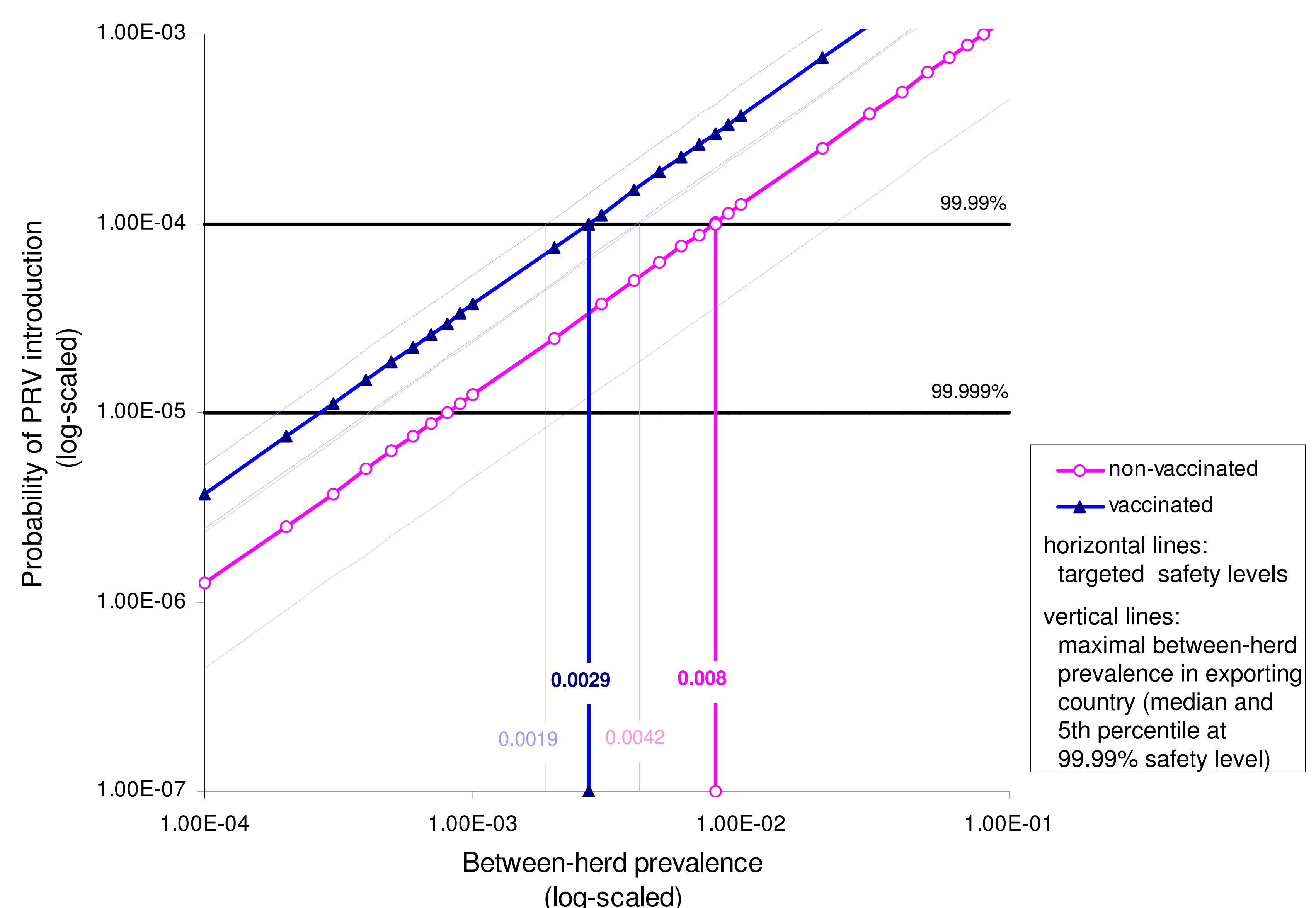
Method and Assumptions

- Stochastic model with input values derived from literature and expert opinion
- Scenario trees to provide an overview of the import processes
- Estimated differences between vaccinated and non-vaccinated animals such as number of days until seroconversion, probability of reactivation, and test performances
- Case example: Prevalence data from Spain (compulsory eradication programme implemented using marker vaccination and culling)
- Assumption: Required control measures in the exporting country before shipment and import requirements would be similar for marker-vaccinated animals as currently for non-vaccinated animals.

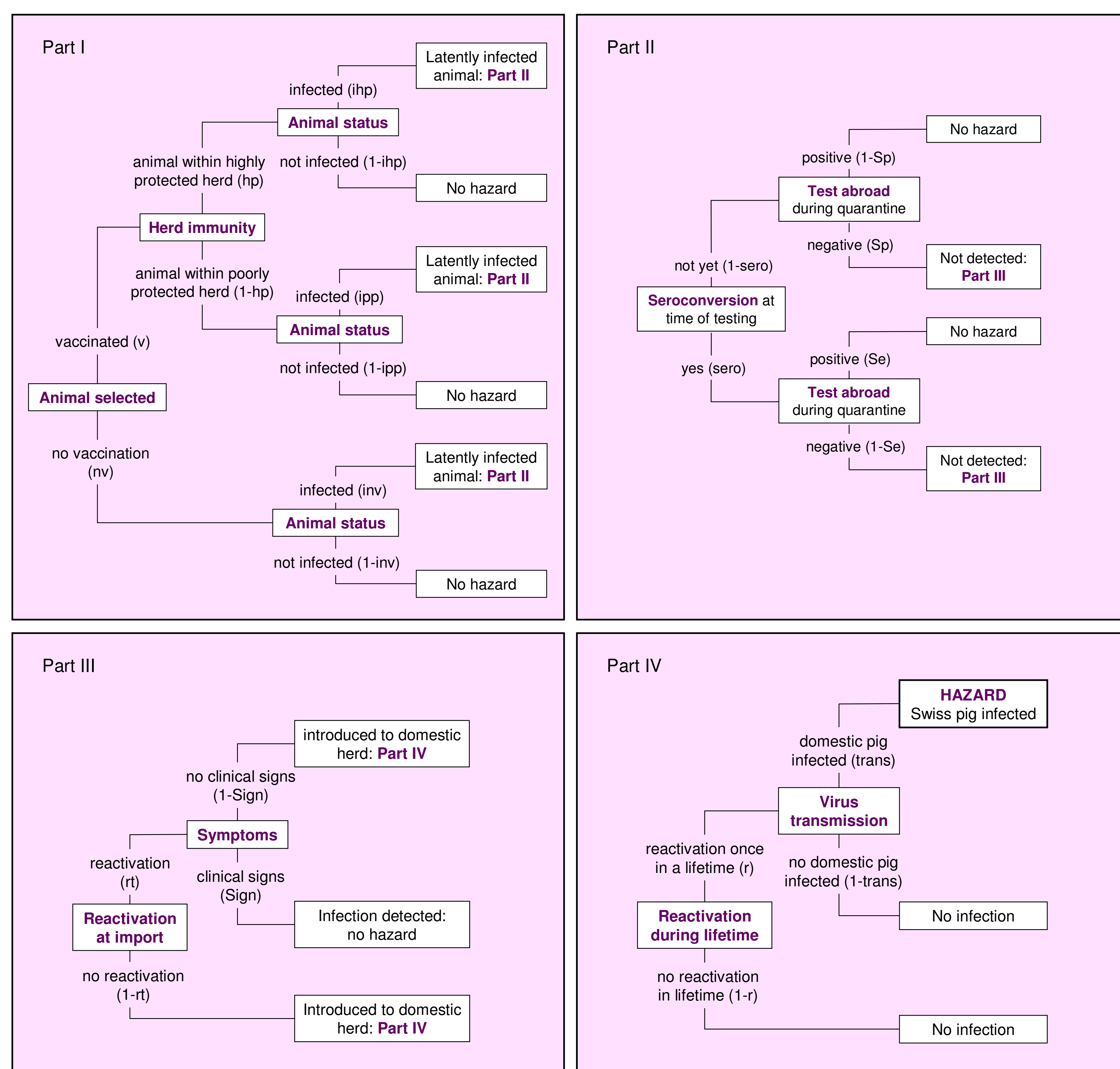
Model outputs showing the probabilities of PRV introduction through the import of one pig from the example region Spain. The ratio between the median values is indicated.

Imported pig	Median	5 th percentile	95 th percentile	Ratio
vaccinated	4.95×10^{-4}	5.87×10^{-5}	1.59×10^{-3}	
non-vaccinated	4.74×10^{-7}	4.78×10^{-8}	1.90×10^{-6}	1042.6

Probability of PRV introduction through the import of one single pig



Scenario trees for the import of a pig from a country not free from PRV



Results

- Sensitivity analysis: Measures of disease presence in the exporting country had major impact on model output
- The ratio between the probability of PRV introduction through vaccinated and non-vaccinated animals remained constant for prevalences from 0.0001 to 0.5
- Results indicate a higher probability of virus introduction through marker-vaccinated pigs
- A non-vaccinated pig from a country with a between-herd prevalence of 0.008 would be 99.99% certain to be PRV-free (under current import regulations)
- For a marker-vaccinated pig, the between-herd prevalence has to be 0.0029 to provide a 99.99% certainty (under current import regulations as for non-vaccinated pigs)

Conclusions

- 1) Results of our models do not justify the recommendation of the import of marker-vaccinated pigs.
- 2) Since the results were strongly dependent on herd level prevalence in the exporting country, solutions should be found to deal with this issue. It may not be sensible to divide exporting countries merely into "free" and "not free".
- 3) It should be considered whether it is legally possible to differentiate infected countries on the basis of actual prevalences. Thereafter, cut-off values for herd level prevalence could be defined using the presented models.