Classical swine fever surveillance in domestic pigs in the European Union

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Over the past decades, emerging and re-emerging diseases, combined with the increasing freedom of trade in animals and animal products have augmented the need to strengthen the disease control systems. Monitoring and surveillance systems that are able to detect new infections at an early stage and can lead to the fast implementation of control measures are of increasing importance for veterinary authorities and policy makers. In addition the demonstration of the disease free status or the precise description of the disease situation is of paramount importance for the trade of animals and their products. In this study, the current surveillance strategies and legislation regarding Classical Swine Fever (CSF) in domestic pigs in the European Union were reviewed and statistical properties assessed.

Records and survey were used to collect relevant data from different regions of the EU. Based on the requirements of legislation, the sample sizes without correction for sensitivity and specificity of clinical, virological and serological tests which are usually applied in the field were compared with the corrected sample size considering the diagnostic test properties. The corrected sample was optimized in such a way that it provided at least one true positive test result if the true prevalence was higher than the design prevalence. Furthermore, a simulation study was conducted to demonstrate the effect of different herd size distributions and various prevalences at animal and herd level on the design prevalence. The software developed in R (http://www.r-project.org/) allows for simulating a specified monitoring system within a definite population.

It can be concluded that the currently used virological and serological tests applied in combination with the current sampling strategy is suitable to attest freedom of disease for the design prevalences and confidence levels specified in the CSF diagnostic manual of the European Union. Targeted sampling on clinically diseased animals (e.g. febrile pigs) would allow to decrease the number of virological tests. However, in order to correct for the properties of the combined test the number of examined animals must be increased. In countries with a high number of backyard pigs (low average herd size, high number of herds) the sample size, false and true test results increase significantly when the same monitoring and test parameters are used. Therefore, attesting freedom from CSF in these areas is difficult by solely relying on laboratory testing given non-perfect test properties. As a consequence, disease awareness and clinical surveillance should have high priority.