

# §2.2

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## SURVEILLANCE STRATEGIES FOR FOOT AND MOUTH DISEASE TO PROVE ABSENCE FROM DISEASE AND ABSENCE FROM VIRAL CIRCULATION

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The free trade of animals and their products is based on the recognition of the animal populations health status as certified by the exporting country on the basis of ongoing surveillance.

According to the OIE *Terrestrial Animal Health Code*, the certification should be based upon:

- Documentation of non-specific surveillance carried out (clinical surveillance, passive notification of suspect cases, etc.)
- Documentation relating to the activities carried out to increase the sensitivity of non-specific surveillance (training activities, rewards/sanctions for notification/failure of notification, etc.)
- Documentation relating to all specific surveillance carried out (random surveys, targeted and risk-based surveillance, convenience testing activities, etc.)

As far as FMD is concerned, besides the recognition of historically free countries, the documentation of the free status traditionally has been based on the results of passive clinical surveillance and random antibody surveys. This paradigm faced its crisis following the adoption of DIVA techniques and the attempt to use DIVA to declare the absence of infection from vaccinated populations.

In vaccinated populations one cannot count upon the high level of confidence of the absence of FMD infection that can be provided by clinical and passive surveillance because vaccination prevents the widespread development of clinically detectable infection. In vaccinated populations, the results of specific surveillance, therefore becomes prominent compared to non-specific clinical surveillance.

Specific surveillance is severely conditioned by the performance of the test(s) employed. The imperfect specificity of any serological test is further worsened in the case of vaccinated populations and the use of DIVA techniques, since the imperfect purification of the antigen used in vaccines may be conducive to antibody production in vaccinated animals.

The difficulty of documenting the absence of infection in vaccinated populations, therefore, becomes evident.

A number of possible ways to overcome this problem have been proposed, some aimed at interpreting the overall results according to the sensitivity and specificity of the diagnostic tests employed, others aimed at a more comprehensive evaluation of complex surveillance systems, trying to quantify or to assess qualitatively the contribution of each sub-population submitted to surveillance to the overall confidence of the absence of infection. The methods most frequently discussed in the literature are:

- those attempting to estimate the true prevalence (or a maximum value for the true prevalence), based on frequentist or Bayesian frameworks,
- targeted and/or risk-based surveillance systems,
- the use of stochastic scenario tree analysis.

The Authors discuss the various approaches proposed, their merits and flaws in documenting the absence of infection or virus circulation for animal diseases in general and FMD in particular. Attention is given to the identification of a set of methods that can be applied in the context of organization as varied as those of the OIE member Countries.