Early detection of European Foulbrood using real-time PCR

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Key words
European foulbrood, *Melissococcus plutonius*, diagnosis, real time PCR, control program

Aim of the study
The main aim was to determine if detection of *Melissococcus plutonius* DNA by real-time PCR in bee samples from the brood nest could help identifying diseased apiaries earlier and allow bee inspectors to conduct targeted visual inspections and thereby avoiding unnecessary, expensive and time-consuming visual inspections of all apiaries in the containment zone around an outbreak.
A secondary aim of the study was to assess the potential for cost reduction by using this technique in comparison with the actual procedure consisting in checking visually all the colonies in the containment zone.

Material and methods
Bee samples were collected in Switzerland during the apicultural season from April to September 2010, from apiaries in restriction zones situated in regions with a high incidence of EFB in previous years. Simultaneously, bee inspectors were asked to evaluate the colonies for presence or absence of clinical symptoms. Bee samples from up to 10 colonies from the same apiary were pooled for the analyze. Results are expressed to one of the three categories (-, +, ++) according the infection rate of the bees. Bee inspectors were asked to complete a questionnaire about the health history of the apiary and, in order to estimate the costs of inspections, questions were included regarding time to check the apiary, travel time and distance to the apiary.

Results and significance
Bee samples of 88 apiaries were assayed by real-time PCR and visually inspected. Comparison of the two methods revealed a sensitivity of the real-time PCR of 93.3 % and a specificity of 45.2 % relative to visual inspection. Due to its poor specificity, preliminary real-time PCR would not allow reducing the number of visual inspections sufficiently to compensate the costs of additional laboratory diagnosis. However, real-time PCR may be a valuable tool for identifying infected colonies in the context of trade and migrating beekeeping. The high rate of “false positive” of the real-time PCR comes of the capability to detect small amount of the pathogen, far before clinical symptoms appear in the colonies. This ability could be used in the future for an early diagnosis and to initiate prophylactic measures.

Publications, posters and presentations
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