

## Novel insights in the interpretation of the faecal egg count reduction test to monitor anthelmintic efficacy

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**Background:** The faecal egg count reduction test (FECRT) is the method of choice to monitor anthelmintic efficacy against gastro-intestinal nematodes. Guidelines on how to conduct a FECRT are available in both public and animal health. Yet, the level of understanding of factors inherent to study design, parasite and/or host species to support these guidelines is poor. Therefore, the objective of this study was (1) to assess the impact of these factors on the interpretation of the FECRT and (2) to propose recommendations for future monitoring programmes.

**Methods:** A simulation study was performed in which the FECRT was conducted under varying conditions of sample size, detection limit, mean faecal egg count (FEC) and aggregation of FEC. Classification trees were built to explore the impact of the above factors on the sensitivity and specificity of detecting a truly reduced efficacy of less than 90 and 95%.

**Results:** All combinations resulted in a reliable detection of reduced efficacy except for small sample sizes (6-20) combined with a high detection limit ( $\geq 12$ ) and/or highly aggregated FEC ( $k = 0.1$ ). As expected, an increase in sample size and a decrease in detection limit improved the conclusions drawn. Yet, these differences were small when moderate sample sizes ( $\geq 20$ ) and high mean FEC ( $\geq 200$  EPG) were combined. Moreover, for drug efficacies ranging from 87.5 to 92.5% and from 92.5 to 97.5% the FECR did not allow reliable diagnosis of reduced efficacy of less than 90 and 95%, respectively, irrespective of the sample size, detection limit and aggregation of FEC.

**Summary/Conclusions:** This study confirms that the interpretation of FECRT is affected by a complex interplay of various factors, including the aggregation of FEC. Moreover, we identified study designs in which the reliable detection of reduced efficacy remains unreliable. Finally, some practical guidelines for evaluating anthelmintic efficacy in future monitoring programmes are proposed.

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