

Assessing agreement between diagnostic methods: an example of coccidia oocysts counting techniques in broiler flocks

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To be able to decide whether an alternative diagnostic test can replace an existing one, a reliable measure of agreement between test results is needed, in particular when no reference is present. In this study, results obtained of an oocyst counting technique (a modification of the standard McMaster technique) and of a recently developed qPCR are compared. The purpose was to assess whether agreement between both tests is sufficient to replace the conventional method by the new. Both methods are applied on faecal samples to measure the level of parasitic infection pressure in broiler flocks, expressed on a continuous scale (oocysts/gram faeces). Pooled faecal samples of 10 flocks, from 4 farms, were repeatedly collected and tested with both tests between d7 and d40 of the production cycle. It is generally accepted that Pearson's correlation coefficient is not suitable to quantify agreement between continuous results of diagnostic methods, as it ignores systematic error (bias). Various alternative methods exist, such as Cohen's kappa for ordered categories and the intraclass correlation coefficient. It was decided to apply the concordance coefficient of correlation (CCC). This method takes into account both precision and bias of test results, by measuring the variation of their linear relationship from the line of perfect agreement through the origin. This resulted in a CCC of 0.751 (95% CI 0.719-0.783), based on Pearson's r of 0.755 (precision parameter) and a bias correction factor of 0.994 (accuracy parameter). Although this outcome seems fairly low at first sight, interpretation of the CCC greatly depends on the purpose of comparison and the desired agreement. For example, a high level of agreement is needed in particular when false results have large consequences. In this study, the new test is developed for routine monitoring purposes and the CCC could be considered sufficiently high. The considerations to use the CCC in relation to the characteristics of the data will be discussed.