BAYESIAN ANALYSIS OF INTERFERING AND TOXICITY EFFECTS IN DILUTION ASSAYS

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- ABSTRACT: Estimation of microorganism densities by means of the Most Probable Number (MPN) is a technique introduced by McCrady (1915) to analyse serial dilution assays. The standard model used to generate MPN tables does not consider medium toxicity nor interference due to competitor microorganisms. In this work we aim to develop a Bayesian framework to analyze these phenomena. MCMC methods using Metropolis-Hastings algorithm were used to get posterior distributions given some experimental results. Convergence was monitored using graphical display and both Raftery e Lewis (1992) and Heidelberg e Welsh (1983) criteria. Model comparison was done using Bayes Factors. It was possible to sort out models with interfering and toxicant parameters that were more probable than standard model for some experimental results. When microorganism do not grow in initial dilutions, the standard model underestimates MPN. In the situations in which standard model is the most probable, MPN estimates from any model are similar, although standart model is the best with smaller credibility interval. A very flexible *R* routine was implemented. It can manage a wide range of dilution designs with more dilutions and more tubes per dilution and is a suitable tool for replacing standard tables in laboratory.

- KEYWORDS: MCMC; bayesian inference; dilution assay; Metropolis-Hastings algorithm; microbiology; most probable number.

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