# Isothermal microcalorimetry for rapid viability assessment of freeze-dried *Lactobacillus reuteri*

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The rapid assessment of viable cells in freeze-dried formulations of probiotic *Lactobacilli* is an important issue in the probiotic industry[1,2]. The probiotic *Lactobacillus reuteri* DSM 17938 is the active ingredient of BioGaia Protectis[3] whose viable cell concentrations are currently determined using the classical and time-consuming viable count technique[4]. In this paper we present a rapid method based on Isothermal microcalorimetry (IMC) for viability assessment of freeze-dried DSM 17938. Fresh and rehydrated freeze-dried cells were incubated in MRS medium at different cell concentration and the thermal power (mW) at 37 °C was measured over time. A linear dependence between the time to reach a certain thermal power value and the decimal logarithm of viable cells was found. This allowed rapid viability assessment of rehydrated cells, reducing the detection time from 48 h (viable count) to 10 h (microcalorimetry) in samples with $3 \times 10^3$ cfu/mL, and to 4 h in samples with $4 \times 10^6$cfu/mL. No significant differences were found between the two methods when freeze-dried rehydrated cells were analysed ($p > 0.05$). Therefore, IMC is a promising tool to be used in the quality control of freeze-dried DSM 17938 as well as other bacteria-based products.

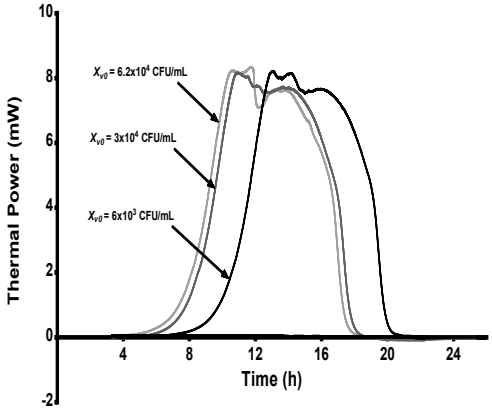


**Figure 1.** Thermal Power curves of rehydrated cells with different cell concentrations

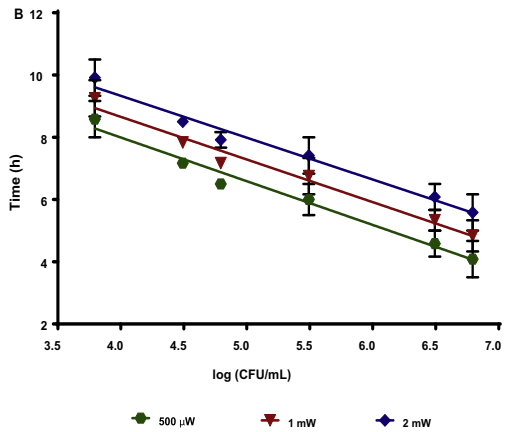


**Figure 2.** Relation between the detection time for different thermal power values and the decimal logarithm of cfu/mL in the freeze-dried formulation

[1] Iniesta M. et al. *J. Clin. Periodontol.* **2012,** *39,* 736-744.
[2] Keller M.K. et al. *Benef. Microbes* **2014,** *5(4),* 403–407.
[3] BioGaia AB. BioGaia Clinically proven probiotics. **2010,** 30 p.
[4] Davis C. *J. Microbiol. Methods* **2014,** *103,* 9–17.