Quantitative Risk Assessment of *Bacillus cereus* Growth during the Warming of Thawed Pasteurized Human Banked Milk Using a Predictive Mathematical Model

Miroslava Jandová, Pavel Měřička, Michaela Fišerová, Aleš Landfeld, Pavla Paterová, Lenka Hobzová, Eva Jarkovská, Marian Kacerovský, Milan Houška

Abstract

Bacillus cereus is relatively resistant to pasteurization. We assessed the risk of *B. cereus* growth during warming and subsequent storage of pasteurized banked milk (PBM) in the warmed state using a predictive mathematical model. Holder pasteurization followed by storage below −18 °C was used. Temperature maps, water activity values, and B. cereus growth in artificially inoculated PBM were obtained during a simulation of manipulation of PBM after its release from a Human Milk Bank. As a real risk level, we chose a B. cereus concentration of 100 CFU/mL; the risk was assessed for three cases: 1. For an immediate post-pasteurization B. cereus concentration below 1 CFU/mL (level of detection); 2. For a B. cereus concentration of 10 CFU/mL, which is allowed in some countries; 3. For a B. cereus concentration of 50 CFU/mL, which is approved for milk formulas. In the first and second cases, no risk was detected after 1 h of storage in the warmed state, while after 2 h of storage, B. cereus concentrations of 102 CFU/mL were occasionally encountered. In the third case, exceeding the B. cereus concentration of 102 CFU/mL could be regularly expected after 2 h of storage. Based on these results, we recommend that post-pasteurization bacteriological analysis be performed as recommended by the European Milk Bank Association (EMBA) and using warmed PBM within 1 h after warming (no exceptions).

Keywords: Bacillus cereus; human pasteurized milk; predictive microbiology; mathematical growth model

Foods 2022, 11(7), 1037.

https://doi.org/10.3390/foods11071037