Investigating the Thermotolerance of *Cronobacter sakazakii* In Powdered Infant Formula

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Abstract

Background

The powdered infant formula (PIF) sector is a growing global market, with Ireland at the forefront of the European exports market; reaching €1.5bn and accounting for 35% of all dairy exports in 2015. However, a major concern associated with PIF is the risk of contamination with the neonatal pathogen *Cronobacter sakazakii*. Although PIF undergoes thermal treatment during manufacture, it is possible that re-contamination of the product may occur via later processing measures. We investigated the resistance of *C. sakazakii* to thermal inactivation following inoculation in commercial PIF as a potential treatment for contaminated powder.

Method

Five strains of *C. sakazakii* cultured in brain heart infusion broth (BHI) were inoculated into dry PIF. Inoculated powder samples were exposed to dry heat at 90℃ for 20 mins and screened for bacterial viability at different time points. Thermotolerant strains were then selected for whole genome analysis.

Results

The *C. sakazakii* strains tested were significantly reduced by the heat treatment with the exception of one strain, *C.sakazakii* DPC 6528, which showed only a 1.0 log reduction in cfu/g after exposure to 90℃ for up to 20 mins. Preliminary genomic analysis of DPC 6528 identified a putative genomic island of ~15Kb. Variants of this island have been previously suggested to have a role in thermotolerance.

Conclusion

C. sakazakii DPC 6528 was found to have increased thermotolerance in PIF compared to other strains which may be linked to the presence of a genomic island.

Keywords: *C. sakazakii*, Genomic Island, Genome, Powdered infant formula (PIF)