Inverse Problems Symposium 2025

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Abstract Title: Inactivation of Thermophilic Sporeformers in Dairy Based High Protein Beverages

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Inactivation of Thermophilic Sporeformers in Dairy Based High Protein Beverages

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Introduction - High-protein dairy beverages have become increasingly popular because of their nutritional value and role in promoting health and fitness. However, their production poses significant microbiological challenges, particularly due to thermophilic spore-forming bacteria, which can survive heat treatments and compromise product quality and safety.

Purpose – The aim of the study was to provide thermal inactivation kinetics of *Geobacillus stearothermophilus* and *Geobacillus thermoleovorans* in dairy based high protein beverages.

Methods - Three model formulations containing 5%, 7%, and 10% milk protein isolate were evaluated for thermal treatment for low-acid shelf-stable beverage. The inactivation process was carried out using thermal death time (TDT) cells immersed in an oil bath at target temperatures of 115°C, 121°C, and 125°C for various times. The Weibull model was applied to assess the inactivation kinetics under these conditions, with model parameters estimated at a reference temperature of 122°C.

Results- The δ values increased with protein concentration, indicating enhanced heat resistance at higher protein levels for both the organisms. For *G. stearothermophilus*, δ values increased from 0.93 min at 5% to 1.84 min at 10%, with corresponding z-values rising from 7.66°C to 8.60°C. Similarly, *G. thermoleovorans* showed δ values ranging from 1.26 min at 5% to 1.71min at 10%, while z-values remained relatively stable (8.10°C to 8.41°C).

Significance- The results indicate that both sporeformers exhibit increased heat resistance with higher protein concentrations, emphasizing the need to optimize thermal processes in high-protein dairy formulations to ensure effective microbial inactivation for commercial sterility of the shelf-stable product.