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Predicting bacterial behaviour in sous vide food

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Abstract

Sous vide foods can be divided into categories depending on the magnitude of the heat treatment they are given. Pathogens may remain in very lightly processed products so the quality of the initial materials is vital and products should be consumed shortly after preparation. Products not for immediate consumption rely on a pasteurising heat treatment followed by chilled storage for safety and preservation. It is recommended that sous vide foods with a shelf-life of ≤ 10 days are pasteurised at 70°C for 2 minutes or equivalent aimed at achieving a 6 log reduction of the most heat resistant vegetative pathogen, *Listeria monocytogenes*. Products with a shelf-life of >10 days should be subjected to a heat treatment of 90°C for 10 minutes or equivalent aimed at achieving a 6 log reduction of spores of Group II (nonproteolytic) *C. botulinum*. Recent years have seen an increase in the number of sous vide foods being cooked at low temperatures (e.g. 40°C to 70°C). Such temperatures have traditionally been considered to be in the “temperature danger zone” for foods and thus their effect on bacterial behavior have not been studied greatly. This creates difficulties when assessing product safety.

In this article we discuss the application of predictive models for inactivation or growth of bacteria to sous vide foods. We explain some basic mathematical and biological principles underlying predictive microbiology, show how existing models may be applied to sous vide products, and highlight some of the limitations of current modelling approaches particularly for long time low temperature processes.

Keywords

Food safety, meat, sous-vide, modelling, *Clostridium botulinum*, *Listeria*, heat resistance, thermal death

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