Modeling the protective effect of a_w and fat content on the high pressure resistance of *Listeria monocytogenes* in dry-cured ham

Food Research International (2015) 75, 194-199

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Abstract

High pressure processing (HPP) is a promising food preservation technology as an alternative to thermal processing for microbial inactivation. The technological parameters, the type of microorganism, and the food composition can greatly affect the microbicidal potential of HPP against spoilage and pathogenic microorganisms. Presently, the number of available models quantifying the influence of food characteristics on the pathogen inactivation is scarce. The aim of this study was to model the inactivation of *Listeria monocytogenes* CTC1034 in dry cured ham, as a function of pressure (347–852 MPa, 5 min/15 °C), water activity (a_w, 0.86–0.96) and fat content (10–50%) according to a Central Composite Design. The response surface methodology, based on the equation obtained with a stepwise multivariate linear regression, was used to describe the relationship between bacterial inactivation and the studied variables. According to the best fitting polynomial equation, besides pressure intensity, both aw and fat content exerted a significant influence on HP-inactivation of *L.monocytogenes*. A clear linear piezoprotection trend was found lowering the a_w of the substrate within the whole range of tested pressure. Fat content was included in the model through the quadratic term and as interaction term with pressure, resulting in a particular behavior. A protective effect due to the presence of high fat content was identified for pressure treatments above *ca*. 700 MPa. At lower pressure, higher inactivation of *L. monocytogenes* occurred by increasing the fat content above 30%. The results emphasize the relevant influence of intrinsic factors on the *L. monocytogenes* inactivation by HPP, making necessary to assess and validate the effectiveness of HPP on specific food products and consequently set process criteria adjusted to each particular food product.