A025 AGSC

High Pressure Pasteurization of *Staphylococcus aureus* Augmented with Mild Heat and Nisin Nisin

Abstract

Introduction: *Staphylococcus aureus* is one of the leading causes of healthcare associated infections in the United States and is an important cause of foodborne diseases in community. Food products are one of main reservoirs of this pathogen. Current study investigated effects of exposure to mild elevated hydrostatic pressure and hydrostatic pressure with nisin for inactivation of *Staphylococcus aureus* in buffered environment. Results of this study could be incorporated as a part of predictive public health microbiology modeling and risk assessment analyses for prevention of foodborne infection and toxicoinfection associated with *Staphylococcus aureus* and for meeting the regulatory requirements such as Food Code, HACCP, and Preventive Control for Human Foods rule of FSMA.

Purpose: Current study investigated effects of exposure to mild elevated hydrostatic pressure and hydrostatic pressure with nisin for inactivation of *Staphylococcus aureus* in buffered environment.

Methods: Hydrostatic pressure at 450 MPa and 350 MPa with addition of nisin (5000 IU/ml) were applied for reduction of a four-strain mixture of *Staphylococcus aureus* in HEPES buffer at 4 and 40 ºC for 0 (control), 1, 3, 5, and 7 minutes. Results were statistically analyzed using Proc GLM of SAS by Tukey-adjusted ANOVA. D-values were additionally calculated using best fitted (maximum R^2) linear model. Study was a randomized block design with two biologically independent repetitions.

Results: Prior to exposure to treatments at 4ºC, counts of the pathogen were 7.95 ± 0.4 log CFU/ml and were reduced ($P < 0.05$) to 6.44 ± 0.3 log CFU/ml after 7 minutes of treatment at 450 MPa. D-value associated with this treatment was 5.34 (R^2=0.72). At 40 ºC, counts were 8.21± 0.7 and 5.77± 0.3 log CFU/ml before and after the 7-min treatments, respectively. D-value associated with 40 ºC treatment was 3.30 (R^2=0.62). Addition of nisin at 350 MPa lead to similar pathogen reductions and inactivation indices indicating that a lower pressure augmented with a bacteriocin could be as efficacious as a more intense treatment.

Significance: Results of this study could be incorporated as a part of predictive public health microbiology modeling and risk assessment analyses for prevention of foodborne infection and toxicoinfection associated with *Staphylococcus aureus* and for meeting the regulatory requirements such as Food Code, HACCP, and Preventive Control for Human Foods rule of FSMA.