

P1-104 Effects of Come-up and Come-down Times on Efficacy of Pressure-based Pasteurization of *Escherichia coli* O157:H7, *Listeria monocytogenes*, and Non-Typhoidal *Salmonella* Serovars



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ABSTRACT

Industrial adoption of microbiological challenge studies are often curtailed due to differences in come-up and come-down times of research and commercial units. Limited information is currently available to quantify the effects of these parameters on efficacy of pressure-based pasteurization. Current study investigated effects of come-up and come-down times on performance of pressure-based pasteurization for inactivation of *Escherichia coli* O157:H7, *Listeria monocytogenes*, and non-typhoidal *Salmonella* serovars. Hydrostatic pressure (350 MPa, 4 °C) and thermal-assisted elevated pressure (350 MPa, 55 °C) were applied at various time intervals (0 to 5 minutes) and various come-up and come-down times of (3 seconds [control], to 5 minutes) for inactivation of strain mixture of wild-type of *Escherichia coli* O157:H7, *Listeria monocytogenes*, and non-typhoidal *Salmonella* serovars, inoculated in phosphate buffered saline at target level of 7.5 log CFU/ml. Experiments were conducted in two biologically independent repetitions, as blocking factors of a randomized complete block design and were conducted in Barocycler Reaction PULSE tubes. Results were statistically analyzed using LSD-based ANOVA by OpenEpi. For high-pressure treatments at 4 °C, come-up times of 30 s, 1 min, 2 min, and 3 min were responsible for modest reductions (P <0.05) of 0.36, 0.42, 0.55, and 0.66 logs CFU/ml of *Escherichia coli* O157:H7, respectively, at 350 MPa compared to control (e.g. standard 3-second come-up time). Similarly, come-down times of 1, 3, and 5 min resulted in modest reduction of *Listeria monocytogenes* for 0.62, 1.11, 0.93 logs CFU/ml, respectively, at 350 MPa and at 4 °C. Predictably, these reductions were augmented (P <0.05) at higher temperatures. Results of this study indicates that come-up and come-down times of a commercial unit could pose a negligible or significant effect on decontamination efficacy of a pressure-based intervention depending of duration and temperature of the treatment as well as the microbial pathogens involved.

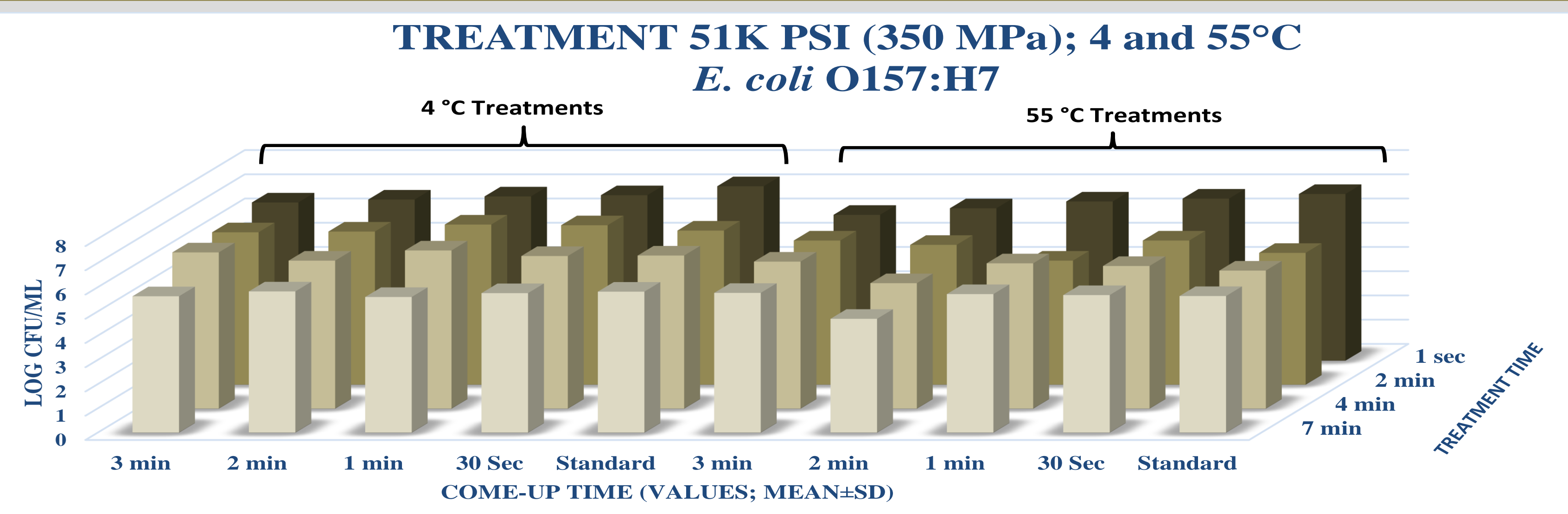
DESIGN, METHODS, & ANALYSES

- ❑ Two biologically independent repetitions (i.e., two blocking factor).
- ❑ Each block, containing three instrumental replications.
- ❑ Each instrumental replication had two microbiological repetitions.
- ❑ Inoculation, microbiological analyses, and enumeration of the bacteria were based on Bacteriological Analytical Methods (BAM) of the U.S. Food and Drug Administration (FDA).
- ❑ Hydrostatic pressure (Barocycler Hub440, Pressure BioScience Inc., South Easton, MA) of 55,000 PSI (379 MPa) were applied at various time interval for decontamination of the inoculated pathogen.
- ❑ ATCC strains:
 - ❑ Shiga toxigenic *E. coli* O157:H7 (six strain): BAA 2196, BAA 2193, BAA 2192, BAA 2219, BAA 2215, BAA 2440
 - ❑ Non-Typhoidal *Salmonella* serovars (five strain): 13076, 8387, 6962, 9270, 14028
 - ❑ *Listeria monocytogenes* (four strain): 51772, 51779, BAA-2657, 13932)

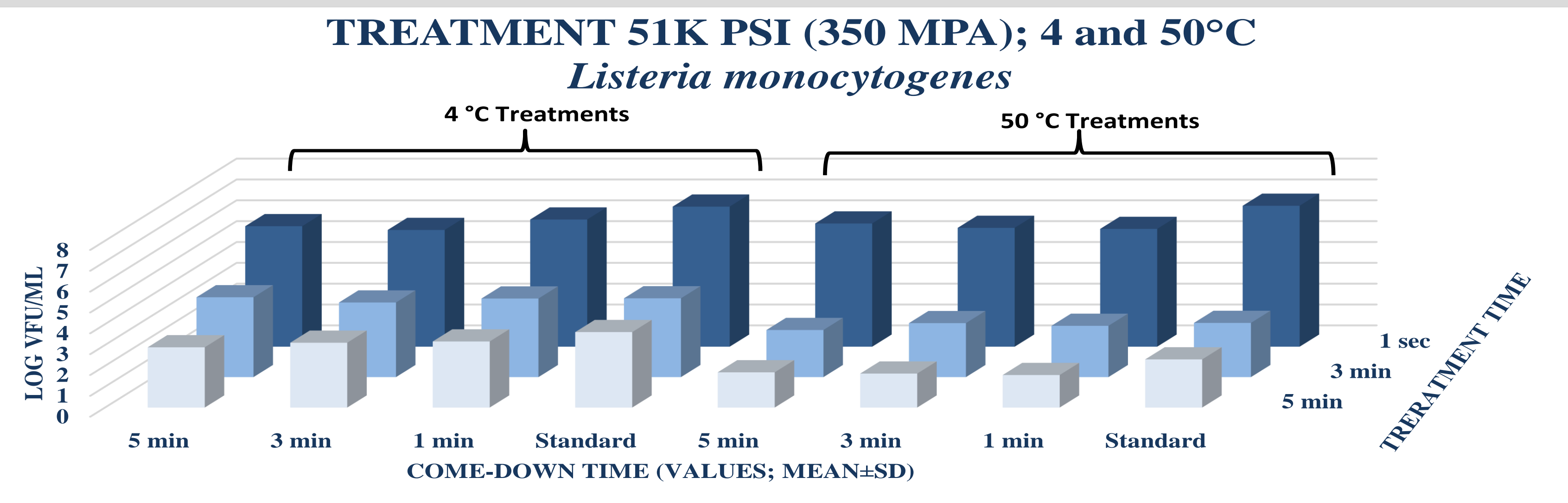
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Effects of come-up time on pressure-based inactivation of Shiga toxin-producing *Escherichia coli* O157:H7



Effects of come-down time on pressure-based inactivation of *Listeria monocytogenes*



Effects of come-up and come-down times on pressure-based inactivation of non-typhoidal *Salmonella* serovars

