Investigation of injured cells due to minimal processing

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Introduction

Minimal pocessing is becoming more popular in food perservation especially in case of fruit juices and smoothies. These new technologies preserves better the valuable properties of fruits, such as vitamins and antioxidants, but at the same time, food safety is at least as important aspect as better product quality. If the treatment measures are not adequate, injured cells may remain in the product, which can cause disease under the optimal conditions.

Aim

Our aim was to examine the extent of damaged cell formation of pathogenic bacteria, *Salmonella* Hartford and *Listeria monocytogenes* in 3 matrixes: in sterile distilled water, in strawberry purée and in fruit smoothie after mild heat treatment and high hydrostatic pressure (HHP) treatment.

Materials and methods

The number of injured cells was examined using the thin agar layer (TAL) method (*Kang and Fung, 1999*). The applied temperatures was: 55 °C, 65 °C and 75 °C with different treatment time, the applied pressure was: 150 MPa, 200 MPa, 250 MPa and 300 MPa, 5 min for all three matrixes. In both heat- and HHP treatment the initial cell number was 10^8 CFU/ml.

Results

The graphs (*Figure 1-4*) show how many damaged cells the different treatments resulted in compared to the total number of cells. In some cases the cell number was under the detectation limit, therefore in these cases no value is visible on the charts. Both HHP and mind heat teratment resulted significant number of injured cell. All three applied heat treatments (55°C, 65°C and 75°C) resulted significant number of damaged cells, while the proportions were lower in pressure treatments. With a few exceptions, the proportion of damaged cells was more than 85% for the heat-treated samples, while the pressure treatment resulted fewer damaged cells in several cases. Based on the results, it can be concluded that the applied gentle treatments are not sufficient in themselves to achieve adequate food safety, so combining them with other treatments is justified.

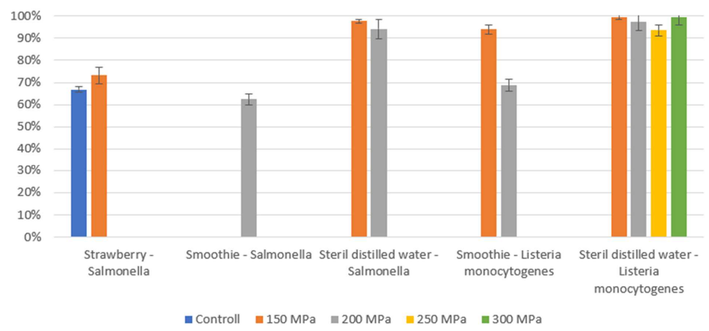

Figure 1: Injured cell % in HHP treated strawberry puree, smoothie and sterill destilled water

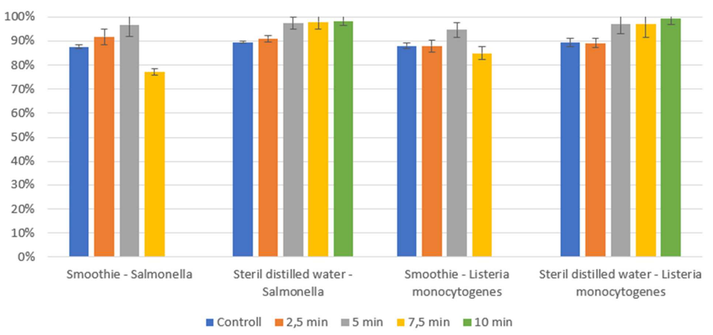

Figure 2: Injured cell % in mild heat treated strawberry puree, smoothie and sterill destilled water at 55°C

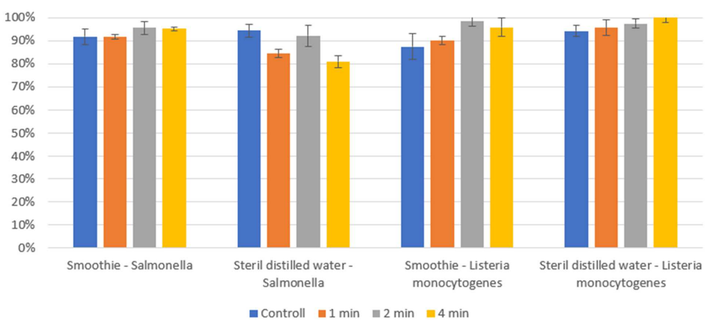

Figure 3: Injured cell % in mild heat treated strawberry puree, smoothie and sterill destilled water at 55°C

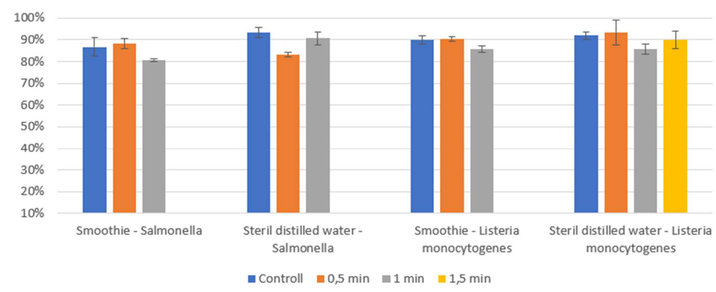

Figure 4: Injured cell % in mild heat treated strawberry puree, smoothie and sterill destilled water at 75°C

Dong-Hyun Kang and Daniel Y. C. Fung, 1999: Thin Agar Layer Method for Recovery of Heat-Injured Listeria monocytogenes, Journal of Food Protection, Vol. 62, No. 11, Pages 1346–1349.

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