



POSTER

EFFICACY OF HIGH-PRESSURE PROCESSING IN EXTENDING THE SHELF-LIFE OF VACUUM-PACKED MEAT PRODUCTS: EVIDENCE FROM MICROBIOLOGICAL ANALYSES

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Aim of the study. High Pressure Processing (HPP) is a non-thermal technology that enhances the microbiological safety and stability of food products by inactivating pathogenic and spoilage microorganisms without causing a significant increase in temperature, thereby preserving products' nutritional characteristics. The study evaluated the potential of HPP to extend the shelf-life of three vacuum-packed meat products by 30%: steak tartare, beef burger, and pre-cooked beef burger with declared shelf-lives of 10, 10 and 28 days respectively.

Methods. Microbiological analyses were conducted on two independent batches of each product type (56 samples in total) to assess the impact of high pressures on products' shelf-life. Within each batch, half of the samples were treated at 6.000 bar for 5 minutes, while the remaining samples served as untreated controls. Process hygiene indicators including total aerobic mesophilic count, Enterobacteriaceae, lactic acid bacteria, β -glucuronidase-positive *Escherichia coli* and *Pseudomonas* spp. were investigated at predefined time points throughout the declared shelf life and for the proposed extension period (T0, T6, T10, T14 for steak tartare and beef burger; T0, T14, T28, T31, T35, T37 for pre-cooked beef burger). The presence of the pathogens *Salmonella* spp. and *Listeria monocytogenes* was assessed at three time points: upon sample arrival in the laboratory, at the declared shelf-life, and at the extended shelf-life.

Results. No appreciable differences were observed between the two batches. Microbiological analyses of untreated products showed a progressive increase in total aerobic mesophilic count, Enterobacteriaceae, and lactic acid bacteria.

In contrast, *Pseudomonas* spp. decreased and fell below the detection limit (< 10 CFU/g), while *E. coli* remained below the detection limit (< 10 CFU/g) throughout the whole observation period. In HPP-treated samples, all investigated microbiological parameters remained below the detection limit (< 10 CFU/g) for the entire storage period, with no detectable microbial growth observed up to the final time point. Neither *Salmonella* spp. nor *L. monocytogenes* was detected in any sample, regardless of treatment.

Conclusions. The results showed that HPP successfully extended the shelf-life of all tested products by up to 30%, even under challenging microbiological conditions, such as high initial contamination levels, likely attributable to temperature abuse during transport. The absence of pathogens in untreated controls precluded a direct evaluation of HPP inactivation efficacy. Nevertheless, evidence from scientific literature supports the effectiveness of HPP in reducing or eliminating foodborne pathogens. In conclusion, HPP represents a valuable technology for mitigating contamination arising during food production, handling and packaging, thereby enhancing product stability and extending shelf-life while maintaining product quality. Further studies should include a larger number of batches and a sensory evaluation to strengthen the evidence on the effectiveness of HPP in terms of microbiological stability and assess the impact on the organoleptic properties of the products.

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