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The Use of High Pressure Processing as a Pathogen Reduction Tool in Raw Pet Food

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Objectives

The Food Safety Modernization Act (FSMA) has established a "zero tolerance" for *Salmonella* in pet food. The objective of this experiment was to evaluate the effectiveness of High Pressure Processing (HPP) and frozen storage time on the inactivation of non-pathogenic, surrogate bacteria populations in raw pet food.

Materials and Methods

Approximately 18 kg of a raw beef pet food was inoculated to a target of 7 logs CFU/g with a 5 strain cocktail of non-pathogenic *Escherichia coli* (ATCC BAA 1427–31) which was previously validated as a surrogate for *Salmonella*. The inoculated product was packaged in 227 g individual roll stock packages and shipped to an external facility for HPP application. Inoculated samples were subjected to HPP at 600 mpa for 480 s. After HPP processing, samples were transported on ice to Colorado State University for determination of the remaining microbial population. The samples were randomly assigned to either sampling at 24-hours post-processing (n = 10) or following 5 d of frozen storage at -23°C (n = 10). Raw product samples were serially diluted in BPW and plated onto selective (Violet Red Bile Agar; VRBA; selective for coliforms) and non-selective (Tryptic Soy Agar; TSA) medias for enumeration.

Results

At 24 h post-processing, following HPP, surviving colonies on VRBA totaled 1.8 logs CFU/g (4.9 log CFU/g reduction) following HPP and frozen storage, surviving colonies on VRBA totaled 0.48 logs CFU/g (6.2 log CFU/g reduction) with 90% of all samples under the detection limit. The TSA survivors totaled 4.8 logs CFU/g (2.1 log CFU/g reduction) 24 h post HPP and totaled 4.6 logs CFU/g (2.3 log CFU/g reduction) post HPP and frozen storage. Data were analyzed using the mixed procedure of SAS (version 9.3; SAS Inst. Inc., Cary, NC) and separated using the PDIFF statement with an α of 0.05.

Conclusion

High Pressure Processing effectively kills pathogenic bacterial strains and causes substantial sub-lethal damage/injury to the bacterial cells, reducing the ability of the bacteria to recover and grow on selective media. Additionally, cellular injury leads to additional lethality in bacterial cells following frozen storage. Therefore, HPP and subsequent frozen storage are effective means of killing significant numbers of bacteria, but these methods do not achieve total death or sterilization. As a result, additional interventions must be investigated to achieve sterility and total destruction of Salmonella.