# MSC THESIS

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**Title of thesis**: Effect of HHP Treatment on Foodborne Pathogenic Bacteria in Fruit Purees

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Consumers are increasingly interested in healthy and high-quality food, which has led to the popularity of smoothies and fruit purees due to their high nutritional value and antioxidant activity. There is a growing need for new food processing methods that retain the organoleptic qualities of food. High hydrostatic pressure processing is a new method that can replace old procedures and ensures minimal changes in sensory, nutritional, and textural properties. This process improves shelf life and ensures microbiological quality without requiring the addition of preservatives, making it a popular choice in the production of fruit purees and smoothies.

High Hydrostatic Pressure (HHP) is a food preservation technique that uses pressure to kill bacteria and enzymes in food while preserving the nutritional and sensory characteristics of food. This method is becoming increasingly popular due to its ability to maintain food quality and safety. The pressure ranges from 100 to 800 MPa and the processing time can range from a few seconds to 30 minutes. HHP is considered an alternative to heat treatments and offers various advantages. *Salmonella enterica* and *Listeria monocytogenes* are pathogenic bacteria that can cause food poisoning, with *Listeria monocytogenes* being especially dangerous due to their high mortality rate. The purpose of this study was to see how effective high hydrostatic pressure (HHP) treatment was at reducing or eliminating *Salmonella enterica* serovar Hartford and *Listeria monocytogenes* in food samples, in order to improve food safety. The study also aimed to determine the extent of injured cells induced by HHP treatment and optimize treatment parameters such as pressure level and treatment time.

The study conducted experiments on the use of high hydrostatic pressure (HHP) treatment to inactivate *Salmonella* Hartford and *Listeria monocytogenes* in different matrices, including sterile distilled water, strawberry puree, and smoothie. The matrices were

inoculated with the pathogens, and the samples were treated with various HHP parameters, including different pressures and times. Three replications were performed for each HHP treatment. The TAL method was used to enumerate the non-injured and injured cells resulting from HHP treatment.

The results indicate that HPP treatment is efficient in reducing the number of *Salmonella* and *Listeria* counts in the samples, although the effectiveness varies depending on the specific pressure utilized and the type of microorganism being targeted. The greater drop in *Salmonella* counts compared to *Listeria* counts could be attributed to changes in cell shape and pressure sensitivity.

The study found that the highest survival rate of *Salmonella* and *Listeria* in distilled water, smoothie, and strawberry puree was in the range of 150 MPa to 250 MPa pressure. However, Listeria did not survive in strawberry puree due to its low pH. It is important to note that Listeria can still be present on the surface of the fruit and proper food safety practices such as washing and storing fruits and vegetables can help reduce the risk of foodborne illness.

The effectiveness of HPP treatment can be enhanced when it's applied for a longer time. However, the reduction in cell counts observed in this study may not be enough for complete microbial inactivation. Further studies are needed to determine the optimal treatment conditions for complete inactivation. Combining HPP with other ecological factors, such as reduced storage temperature, low pH, and natural antimicrobial compounds, can increase food safety.