Introduction

- The Center for Disease Control and Prevention estimates foodborne illnesses are responsible for the sickness of 48 million U.S. citizens, from which 120,000 are hospitalized and 3,000 die.
- Listeria monocytogenes is held responsible for 19% of the foodborne infections acquired in the U.S.
- Listeria monocytogenes is a pathogen that is ubiquitous in nature which is associated with soil, plants, animal products, and food processing environments.
- Lactic acid bacteria has proven effective at inhibiting foodborne pathogens, including Shiga Toxin producing Escherichia coli (STEC), Salmonella, and Listeria monocytogenes, in culture media and/or food products.
- Lactic acid bacteria has the ability to form an antagonistic environment through the production of organic acids, hydrogen peroxide, and bacteriocins.

Objective

To evaluate the mechanisms of inhibition on L. monocytogenes by a 4-strain cocktail of LAB (Lactiguard™, NP51, NP28, NP7 and NP9) at different temperatures.

Methodology

- **LAB cocktail**
- **Incubator**
- **Dilutions**
- **Spread Plating**

Results

- For both LAB treatments (washed cells and freeze-dried product), after 24 hours the pH ranged approximately from 3.88-4.29 with the control samples having a pH of 4.64. Both LAB treatments with and without enzyme at 37°C resulted in less L. monocytogenes by approximately log 5.675 CFU/ml when compared to the control. At 7°C, the pH after 5 days was higher, ranging from 5.11-5.98 for both LAB treatments with the control being at 6.08. For both treatments, after 5 days, there was more than a 2 log reduction of L. monocytogenes in samples without added enzymes and with catalase.
- This indicates that the addition of catalase to inactivate hydrogen peroxide did not result in changes in the inhibitory capacity. However, in all samples treated with the other enzymes, there was no significant reduction in the pathogen after 5 days.

Conclusions

- The mechanism of action to inhibit Listeria monocytogenes was temperature dependent, where inhibition at 37°C was primarily due to a drop in pH due to the production of lactic acid.
- At 7°C the mechanism of action of the inhibition was primarily due to the production of protein based compounds, where there was no reduction when enzymes inactivated the proteins.
- The amount of catalase added (1 mg/ml) was found not to be enough to inactivate hydrogen peroxide to an extent where it affected the mechanism of action of LAB in the reduction of Listeria monocytogenes.

References: