



Validation of the Effect of Listex P100 Bacteriophage on Survival of *Listeria Monocytogenes*

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Objectives

The objective of this study was to validate LISTEX P100 (P100) phage lethality on *Listeria monocytogenes* (LM) when sprayed on the surface of 3 RTE sliced deli meat products.

Materials and Methods

Sliced cured ham, un-cured turkey and cured corned beef were subjected to 5 treatments of P100 using Sono-tek ultrasonic spray equipment with nozzle directed on the face of the RTE sliced product. 10cm² of one slice was inoculated with a 5 strain cocktail of LM at 0.005ml (5ul/cm²) for a total of 0.02 mL (20ul) of the cell suspension to target 1 × 10⁵ CFU/slice. Calibrated spray of P100 was applied on inoculated slices using Sono-tek ultrasonic spray equipment. The inoculated slice were aseptically placed on top of a non-inoculated slice sprayed with the same dosage of P100, both slices were transferred into bags, vacuum packaged and stored at 4°C. 3 samples per treatment per meat product were analyzed for surviving LM at 0, 6, and 24 h. after spraying P100. Bags were cut open, 40 mL buffered peptone water was added and stomached for 60 sec. and 0.1 and 0.01 mL of liquid was surface plated on MOX and incubated at 35°C for 48 h. Bacterial colonies were expressed as Log₁₀CFU/sample (10 cm²).

Results

Ham. There was significant ($P < 0.05$) reduction in LM for all treatments 6 h. post application of P100 compared to control. TRT4 was significantly ($P < 0.05$)

lower compared to TRT2 and TRT3 but not significantly ($P > 0.05$) different from TRT5. 24 h. post application of P100, all treatments were significantly ($P < 0.05$) lower in LM compared to control.

Turkey. There was significant ($P < 0.05$) reduction in LM for all treatments 6 h. post application of P100 compared to control. TRT4 was significantly ($P < 0.05$) lower compared to TRT2 and TRT3 but not significantly ($P > 0.05$) different from TRT5. 24 h. post application of P100, TRT4 was significantly ($P < 0.05$) lower in LM compared to control and TRT2 but not significantly ($P > 0.05$) different from TRT3 or TRT5.

Corned beef. There was significant ($P < 0.05$) reduction in LM for all treatments 6 h. post application of P100 compared to control. TRT3 and TRT4 were significantly ($P < 0.05$) lower compared to TRT2 and TRT5 but not significantly ($P > 0.05$) different from each other. 24 h. post application of P100, all treatments were significantly ($P < 0.05$) lower in LM compared to control, but were not significantly ($P > 0.05$) different from each other.

All products had greater than 1 log kill of LM after 6 and 24 h of treatment with P100.

Conclusion

Phages, the natural enemy of bacteria have co-evolved with their bacterial hosts. They are ubiquitous, 100 times smaller and outnumber bacteria by 10 fold. P100 is a T-4 or lytic phage which has broad *Listeria* host range. P100 phage attaches to *Listeria* by binding to the outer lipopolysaccharide molecule on the cell surface and injecting its DNA into the host. This study shows that all levels of P100 had greater than 1 log LM

kill 6 and 24 h. after spray treatment. Higher levels of P100 (1.0, 2.0, and 5.0%) showed marginal increase in LM kill compared to 0.5% P100 treatment. 1ul/cm² spray of 5% P100 provided similar LM kill compared to 5ul/cm² spray of 1% P100.

Treatments	Targeted P100/ml, PFU	Volume of spray/cm ²	No of P100/cm ² , PFU
TRT1: Control (water spray)	0	5ul/cm ²	0
TRT2: 0.5% P100	1 × 10 ⁹	5ul/cm ²	5 × 10 ⁶
TRT3: 1% P100	2 × 10 ⁹	5ul/cm ²	1 × 10 ⁷
TRT4: 2% P100	4 × 10 ⁹	5ul/cm ²	2 × 10 ⁷
TRT5: 5% P100	1 × 10 ¹⁰	1ul/cm ²	1 × 10 ⁷