Inhibition of Listeria monocytogenes in RTE Beef Strips using NATPRE T10, Celery Powder and Nitrite

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I. INTRODUCTION

In the last decade, there has been continuous progress in evaluating ingredients for processed meats using natural ingredients designed to satisfy consumer preferences and microbiological standards for natural processed meats (*1*). Curing meat products is important not only for product quality but also for safety. Currently, nitrites are used to cure most meat products as well as celery powder, which also contains nitrites (*2*). A natural bacteriostatic alternative, Prosur NATPRE T-10 is currently applied to achieve similar curing characteristics in processed meats. Comparing the product quality is an important aspect of implementation in the meat industry as a curing alternative (*3*). This study was designed to assess the bacteriostatic capability of a novel, natural ingredient (Prosur NARPRE T10) in RTE meat strips by studying its ability to prevent the outgrowth of *Listeria monocytogenes* without compromising its savory flavor compared to the use of nitrite and celery powder.

II. MATERIALS AND METHODS

Ready to Eat meat strips with different ingredient concentrations: 0.52% celery, 0.25% nitrites, or 1% Prosur NATPRE T10, and a negative control/uncured, were produced. Three replicates of strips (5 samples/time point/treatment/replicate) were inoculated with 250µl of a multi-strain mixed Listeria monocytogenes cocktail to yield a 2-3 log concentration on a 25g meat strip. After inoculation, each strip was vacuum-sealed individually in polybags and allowed to attach for 20 minutes. Packaged samples were incubated at a time temperature abuse of 32 °C. Samples were removed at 0, 6, 12, 24, 48, 72, and 96 hours. Samples were hydrated with 225ml of BPW, homogenized by hand for 30 seconds, and serially diluted. then plated in duplicate on an overlay of tryptic soy agar (TSA) on Oxford agar base modified (MOX) supplemented with Moxalactam (Remel™) (*4*). All means were compared using a one-way analysis of variance (ANOVA) with a 95% confidence level and a Tukey's multiple comparison test for significantly different means ($p < 0.05$) in R software 4.2.3.

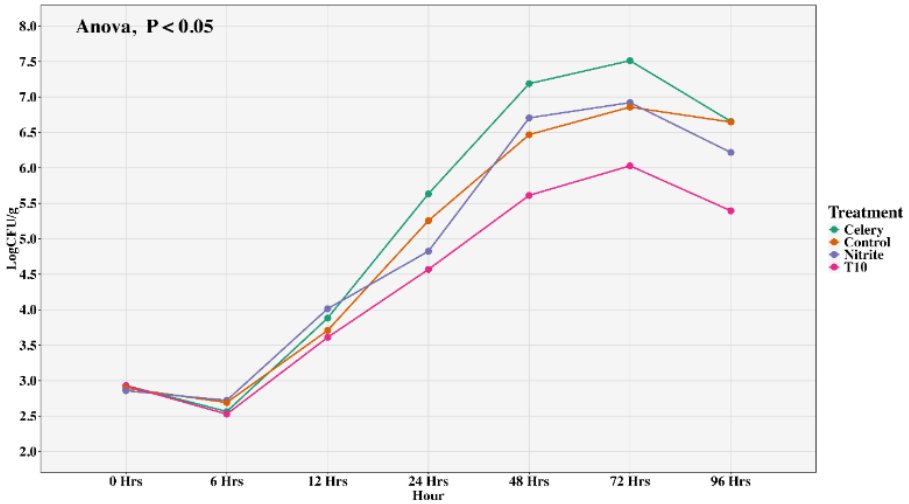
III. RESULTS AND DISCUSSION

L. monocytogenes counts in smoked beef strips are illustrated in Table 1 and represented in Figure 1. Plate counts for all treatments at 6 and 12 hours were not statistically different ($p > 0.05$) in growth compared to time 0 within each treatment over time. However, meat strips prepared with Prosur NATPRE T-10 showed statistically lower ($P<0.05$) LogCFU/g counts at 24, 48, 72, and 96 hours compared to the other formulations. Counts were statistically lower ($p < 0.05$) on average by 1.06, 1.58, 1.48, and 1.26 LogCFU/g at 24, 48, 72 and 96 hours, respectively. Similar results were observed in a cooked ham study cured with natural ingredients (*5*).

Table 1. *L. monocytogenes* growth on beef strips produced using NATPRE T10, nitrites, celery powder, and negative control over time during storage at 32°C.

	***L. monocytogenes* plate counts (Log CFU/g) (Mean ± SE*)**				***P*-value**
Time	**NATPRE T10**	**Nitrites**	**Celery**	**Control**	
0h	2.93 ± 0.10^{a}	2.86 ± 0.08^{a}	2.93 ± 0.09^{a}	2.89 ± 0.09^{a}	0.939
6h	2.53 ± 0.11^{a}	2.72 ± 0.10^{a}	2.56 ± 0.10^{a}	2.69 ± 0.10^{a}	0.496
12h	3.61 ± 0.17^{a}	4.01 ± 0.15^{a}	3.88 ± 0.10^{a}	3.71 ± 0.23^{a}	0.363
24h	4.57 ± 0.29^{b}	4.82 ± 0.16^{ab}	5.63 ± 0.20^{a}	5.26 ± 0.19^{ab}	0.006
48h	5.61 ± 0.14^{c}	6.71 ± 0.22^{ab}	7.19 ± 0.15^{a}	6.47 ± 0.16^{b}	< 0.001
72h	6.03 ± 0.13^{b}	6.92 ± 0.18^{a}	7.51 ± 0.19^{a}	6.86 ± 0.21^{a}	< 0.001
96h	5.4 ± 0.17^{b}	6.22 ± 0.32^{ab}	6.66 ± 0.34^{a}	6.65 ± 0.35^{a}	0.017

Figure 1. *L. monocytogenes* counts (LogCFU/g) on four beef strip treatments at different time points (n= 15 samples/beef strip/sampling point).



IV. CONCLUSION

The clean label fruit and spice extract NATPRE T10 demonstrated better control over the outgrowth of *Listeria monocytogenes* compared to traditional synthetic nitrites.

V. REFERENCES

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