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Effects of Plant Extract Addition on Listeria Monocytogenes Growth in Highly Extended Sliced Cooked in Ham

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Objectives

The objective of this study was to evaluate the effect of a plant extract blend containing rosemary and citrus extract on controlling the growth of *Listeria monocytogenes* in highly extended sliced *cook-in* ham during refrigerated storage at 7°C.

Materials and Methods

The experiment comprised 2 treatments, control (no plant extract addition) and 0.4% of rosemary-citrus extract blend (Cleanatis M1, Naturex). This study was conducted using a standard ham formulation yielding an end product weighing 170% of the raw material used, in this case pork leg meat cuts. The different ham muscles obtained from the pork leg were injected with a brine solution containing water, sodium chloride, phosphates, sodium nitrite, sodium erythorbate, hydrolyzed corn syroup 40DE, monosodium glutamate, carrageenan and aromas. Each lot included one batch of samples tumbled (7 cycles/min) under vacuum, at controlled temperature between 0 and 4°C for 9 h and stuffed in polyamide impermeable casings (60 mm diameter to form cooked ham pieces with approximately 1.2 kg each. The ham pieces were cooked in water tanks (80°C) at a commercial pilot plant to reach 72°C. Cooking time was approximately 1 h and 30 min. After the cooking stage, samples were cooled with ice and refrigerated at 0 to 4°C overnight The ham pieces were transported to CTC/ITAL on ice box and immediately sliced for microbiological analysis at arrival. The ham slices (2 to 3 mm) were inoculated with 0.1 mL of of *L. monocytogenes* ATCC7644, to yield approximately 4 log CFU/g. Inoculated samples were vacuum packaged in gas-impermeable pouches and stored at abuse temperature (7°C), very common in Brazilian retail market, for up to 16 d. Bacterial populations were determined following ISO 11290–2:2017 method. Triplicate samples of each treatment were assayed at 0 time and after 2, 4, 6, 8, 10, and 12 d of storage for *L. monocytogenes* populations. In addition, triplicate inoculated samples were assayed for lactic acid bacteria populations following ISO 15214:1998 method. Data Interactions and main effects were considered significant at $P < 0.05$. The data were submitted to analysis of variance to evaluate the effect of the treatments, storage time and the treatment × time interaction using Statistica 7.0 (StaSoft Inc). The difference between the mean values was evaluated by Tukey´s test at the 95% confidence level.

Results

During storage, the difference between *L. monocytogenes* counts in the treatment containing the plant extracts and control was 0.5 log CFU/g. There was a significant effect ($P < 0.05$) of the interaction treatment *versus* time on *L. monocytogenes* growth, the counts remained 0.5 log lower on samples containing the plant extract blend. Lactic acid bacteria counts were below 1.0 Log CFU/g during shelf life for both treatments.

Conclusion

These data suggest that the plant extracts blend can enhance the safety of sliced *cook in* ham. It is important to evaluate the effect in meat systems without nitrite addition or along with other interventions that inhibit growth, like post packaging pasteurization.

