STEAM BASED POST-PROCESS PASTEURIZATION OF BEEF SALAMI FOR CONTROL OF *LISTERIA MONOCYTOGENES*

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Summary

We evaluated the destruction of *Listeria monocytogenes* on surfaces of artificially inoculated, vacuum-packaged beef salami by steam pasteurization (Stork RMA-Protecon Post-process Pasteurizer). Beef salami was inoculated with *L. monocytogenes* (initial concentrations of 4.36 $\log_{10}$ CFU/cm^2 at the end and 4.49 at the middle), then pasteurized at 185, 194, or 203°F for 2 or 4 min. Only about 0.11 $\log_{10}$ CFU/cm^2 (detection limit) *L. monocytogenes* survived after pasteurization at 203°F for 2 and 4 min, for a "kill rate" of over 99.99%. Post-packaging pasteurization reduces the threat of *L. monocytogenes* on the surfaces of cooked meat products.

(Key Words: Post-Processing Pasteurization, Beef Salami, *Listeria monocytogenes*.)

Introduction

Listeria monocytogenes, an important cause of foodborne diseases in humans, contaminates a variety of meats. It can easily aerosolize, making it easy to spread, and can survive and grow at refrigeration temperatures.

Irradiation and thermal-based pasteurization are being investigated to reduce its risk in ready-to-eat (RTE) meats. Because cooking during production of RTE meats eliminates most harmful pathogens, research is focusing on post-packaging pasteurization. Our objective was to evaluate the effectiveness of the Stork Post-process Pasteurizer in reducing or eliminating *L. monocytogenes* on the surface of packaged RTE meat.

Experimental Procedures

Five strains of *L. monocytogenes* (101 M, 108 M, 109, serotype 4c ATCC, and 3 ATCC) were diluted to produce a mixed inoculum concentration of about 1×10^9 CFU/ml.

Retail packages (300 g) of beef salami were procured and stored at 40°F until pasteurization. Beef salami was placed on a sterile stainless steel wire rack held in a stainless steel trough in a "biocontainment" chamber, and was mist inoculated with the 5-strain *L. monocytogenes* inoculum. The inoculated products were placed in a laminar flow cabinet for one hour at room temperature to allow microbial attachment.

All inoculated products were then vacuum-packaged and pasteurized at the Kansas State University Aseptic Processing Laboratory. Inoculated packages were surface pasteurized in a Stork RMS-Protecon Post-Packaging Pasteurization Chamber for either control, 2, or 4 min at 185, 194, or 203°F.

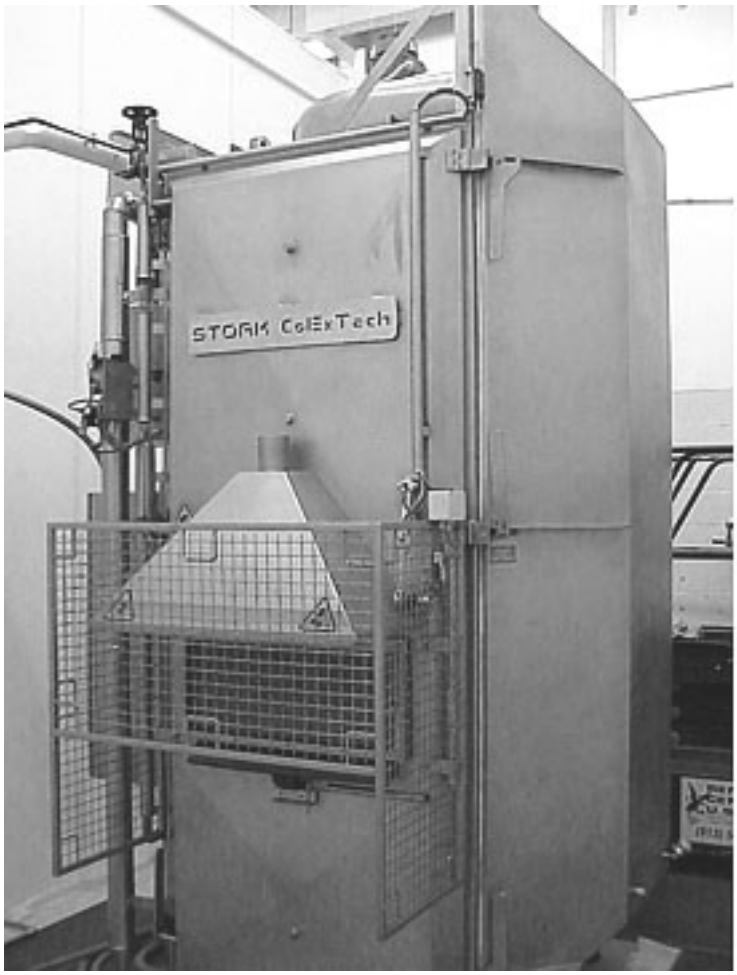
Immediately after pasteurization, all packages were immersed in ice water for 10 min, then sampled. Packages were surface sampled by removing the casings from the end (1.5 cm) caps from both sides and

combining both end caps from one sausage to give the "end" sample. The rest of the casing served as the middle sample.

The end and middle samples from beef salami were diluted with 0.1% sterile peptone water (PW), stomached for 2 min, serially diluted in PW and plated on Modified Oxoid Agar (MOX) (Difco Laboratories, Detroit, MI) and incubated at 98.6°F for 24 h. Colonies were counted and reported as $\log_{10}$ CFU/cm^2. Three replications were performed for each treatment.

Results and Discussion

Mean inoculum levels were 4.26 $\log_{10}$ CFU/cm^2 for end and 4.49 for middle portions. Pasteurization of salami at 185°F for 2 min reduced surface *L. monocytogenes* by about 3.65 (end) and 3.18 (middle) $\log_{10}$ CFU/cm^2, while pasteurization at 185°F for 4 min reduced *L. monocytogenes* by 4.26 $\log_{10}$ CFU/cm^2 for both end and middle portions. Pasteurization at 194°F for 4 min achieved similar results. Only 0.11 $\log_{10}$ CFU/cm^2 (detection limit) *L. monocytogenes* were recovered from middle and end surfaces of salami pasteurized at 203°F for 2 and 4 min, representing a "kill rate" of over 99.99%.



STORK Steam Pasteurization Unit in the KSU Aseptic Processing Laboratory.