2019 Reciprocal Meat Conference– Meat and Poultry Safety

Meat and Muscle Biology™

Fate of *Salmonella* ssp., *Listeria monocytogenes*, and *Campylobacter* ssp., During Fermentation and Drying of Duck Salami

S. Watson[1]*, N. Ostiguy[2], C. N. Cutter[3], and J. A. Campbel[1]

[1]Department of Animal Science, The Pennsylvania State University, University Park, PA, USA
[2]Department of Entomology, The Pennsylvania State University, University Park, PA, USA
[3]Department of Food Science, The Pennsylvania State University, University Park, PA, USA
*Corresponding author. Email: scw186@psu.edu (S. Watson)

Keywords: *Campylobacter*, duck salami, *Listeria monocytogenes*, *Salmonella*
Meat and Muscle Biology 3(2):134

Objectives

Creating artisanal, dry salami products is an increasing trend for charcuterie companies in the United States. These raw, ready-to-eat products are required by USDA-FSIS to have a scientifically valid HACCP system addressing relevant biological hazards. To our knowledge, no literature exists for the validation (at least a 5 Log_{10} reduction of pathogens per FSIS) of salami products containing duck. Therefore, an experiment was designed to validate the safety of duck salami. The objectives of this study were to validate the safety of fermented and dried duck salami and to investigate if a duck salami manufacturing processes could achieve a 5 LOG_{10} (CFU/g) reduction of *Salmonella* ssp., *Listeria monocytogenes,* and *Campylobacter* ssp.

Materials and Methods

Duck trim and pork belly (70% duck trim, 30% pork belly) were placed in a mixed culture bath approximating three liters. The culture bath was made by growing individually and then combining three strains each of *Salmonella* spp. and *Listeria monocytogenes,* two strains of *Campylobacter jejuni,* and one strain of *Campylobacter coli.* After inoculation, meat was air dried (30 min @ 23°C), tumbled with one liter of 2.5% Beefxide^{O}antimicrobial treatment (lactic and citric acid and hydrogen peroxide), and placed in a walk-in cooler (2–4°C) overnight. After inoculation and antimicrobial treatment (~24 h), the meat was ground (6mm grinding plate) and seasoned with salt (2.5%), cure ($NaNO_3$ & $NaNO_2$), spices, and starter culture. The ground duck-pork mixture was stuffed into 55mm collagen casings, fermented for 48 h (23°C, 95% rH), and dried (12°C, 75% rH) to ~45% weight loss (approx. 5 wk). Salamis were then vacuum packaged and stored at 23°C (approx. 4 wk). Three independent replications were conducted, and pathogen concentrations, pH, and water activity (aw) were analyzed at Days 0, 1, 2, 3, 5, 10, and weekly until Day 66 during each replication. Critical parameters for production included a final pH less than 5.3 and final aw less than 0.90.

Results

A 5 LOG_{10}(CFU/g) reduction was achieved for all three pathogens. *Salmonella* achieved a 5.47 LOG_{10}(CFU/g) ($p < 0.0001$) reduction by Day 38, *Listeria monocytogenes* achieved a 5.20 LOG_{10}(CFU/g) ($p < 0.0001$) reduction by Day 59, and *Campylobacter* achieved a 6.85 LOG_{10}(CFU/g) ($p < 0.0001$) reduction by Day 45. Final reductions of 7.03 ($p < 0.0001$), 5.90 ($p < 0.0001$), and 7.19 ($p < 0.0001$) LOG_{10}(CFU/g) were achieved for *Salmonella* spp., *Listeria monocytogenes,* and *Campylobacter* spp., respectively. During the entire fermentation and drying process, populations of each species never increased by more than 1 LOG_{10} (CFU/cm^2). A final pH of 5.11 and a final a_w of 0.81 were also achieved.

Conclusion

The results of this study indicate that the parameters used to ferment and dry this product are able to achieve a 5 LOG_{10} (CFU/g) reduction of each pathogen to validate the safe production of duck salami.