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Meat and Muscle Biology™

Microbial Validation of Dry Aged Beef Trim for Incorporation into Premium Ground Beef

K. Philipps[1], T. Langford[1], B. Harsh[1], S. Williams[1], and J. M. Scheffler[1]*

[1]Department of Animal Sciences, University of Florida, Gainesville, FL, USA
*Corresponding author. Email: jmscheff@ufl.edu (J. M. Scheffler)

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Objectives

Dry aging treatments impart unique flavors desirable by a segment of the population. Ground beef offers flexibility of use at a lower price point. There is potential to add value to lower priced beef cuts by dry aging them and incorporating them into premium grinds. However, the long dry aging period could allow growth of key pathogens. To determine the risk, the prevalence and potential for growth must be assessed. The effect of a dry aging treatment on the population of *Salmonella* and *Listeria monocytogenes* was studied.

Materials and Methods

An in-plant assessment of *E. coli* O157:H7, *Salmonella*, and *Listeria monocytogenes* was conducted by swabbing both the fat and lean sides of 25 ribeye rolls or striploins before direct plating and finally enriching samples. Beef shoulder clods were purchased and used to simulate dry aging. The product was cut into 10 cm × 10 cm blocks before inoculating both fat and lean surfaces with a cocktail mixture containing two strains of *Listeria monocytogenes* and five strains of *Salmonella* at a rate of 10^3 CFU/cm^2. Blocks were allowed to dry for 15 min between inoculation of sides and before suspension in a refrigerator (4°C) with a circulating fan and 70–80% humidity. Surfaces were removed at a depth < 5mm for collection and plating on selective media at 0, 1, 7, 14, 21, and 28 d post inoculation. Two sides of six blocks were used at each time point; the experiment was replicated a second time. Data were analyzed to test the effect of time, side, and their interaction for each pathogen; replication was a random variable.

Results

Samples collected in a commercial facility showed no occurrence of *E. coli* O157:H7 or *Salmonella*, but three presumptive *Listeria monocytogenes* colonies were found in the quantitative analysis. The plant does not process ready-to-eat products, the main concern with *Listeria monocytogenes.* Since all product will be trimmed and cooked prior to consumption, and with the low amount of *Listeria monocytogenes,* the risk associated with *Listeria monocytogenes* is relatively low. To validate use of the dry aging treatment on sub-primals to be used for ground beef, the microbial population of the key pathogens used during inoculation must not increase over the treatment period. *Salmonella* levels on d 1 and 14 were similar ($P = 0.53$), but numerically less than d 0, and lower ($P = 0.0028$) on d 1, 21, and 28. There was an effect of side of inoculation; the fat side had significantly higher ($P = 0.046$) *Salmonella* levels over the duration of the study. This suggests that *Salmonella* may have had slightly better attachment to fat at inoculation, but it had no bearing on growth dynamics thereafter. There was no day by side interaction detected ($P = 0.51$). *Listeria monocytogenes* showed a similar overall trend; counts were similar on d 7, 14, and 21 ($P = 0.079$), and numerically less than d 0, whereas counts were lower ($P = 0.014$) on d 1 and 28. No effect of side ($P = 0.21$) or a day by side interaction ($P = 0.66$) were observed.

Conclusion

Overall, *Salmonella* and *Listeria monocytogenes* did not increase during the 28d aging period, indicating that dry-aged beef trim is not higher risk than fresh beef trim. Thus, additional risk mitigation steps may not be necessary during processing of dry aged versus fresh ground beef.