



Validation of a Restructured Beef Jerky Product and Process to Reduce Pathogen Loads and Improve Shelf Stability in Ethiopia

T. N. Langford^{1*}, J. Brown¹, C. Carr¹, A. Havelaar¹, S. Williams¹, and J. M. Scheffler¹

¹Animal Sciences, University of Florida, Gainesville, FL, USA

*Corresponding author. Email: taylorlangford@ufl.edu (T. N. Langford)

Keywords: Africa, animal-source foods, beef, food safety, food safety risk
Meat and Muscle Biology 3(2):141

Objectives

Animal-sourced foods (ASFs), such as meat, provide nutrients that are beneficial for physical and cognitive development, especially in developing countries. Despite Ethiopia containing Africa's largest inventory of livestock, market structure and inefficiencies in livestock and meat industries contribute to low-per capita consumption of meat. The combination of extensive periods of fasting from ASFs, knowledge gaps in hygienic handling and sanitation, lack of infrastructure and preservation, and weakly enforced food safety regulations contribute food safety risks in an already protein-deficient population. The objective of this study is to develop a dried beef jerky procedure that will reduce pathogen loads in meat, improve shelf stability, and increase access to ASFs in Ethiopia.

Materials and Methods

Challenge studies were performed to validate a restructured jerky production process for control of five serotypes of *Salmonella enterica* (Saint Paul, Anatum, Typhimurium, Newport, Dublin) and three strains of *E. coli* O157:H7, within the constraints of equipment and ingredients available in Ethiopia. A traditional Ethiopian spice mixture was added to lean ground beef (94% lean, 6% fat), and in separate trials apple cider vinegar and pureed raisins were incorporated at varying percentages of the overall weight. The ground meat mixture was formed into strips and dehydrated to achieve a_w of less than 0.70 for shelf stability and samples were plated for

enumeration before and after drying. A consumer taste panel was conducted with treatments (0% and 15% raisin inclusion) to determine the acceptability of Ethiopian consumers. Sixteen Ethiopian consumers (10 men and 6 women) were asked to answer study-related questions and evaluate jerky products on visual appeal, texture, off-flavor, and overall liking on a 10-point hedonic scale.

Results

Vinegar inclusion negatively impacted log CFU reductions of *S. enterica* as the control demonstrated significantly higher ($P = 0.04$) reductions than treatments including vinegar at 0.5, 1, and 2%. Including 15% raisins (w/w) in the meat and spice mixture resulted in an increased ($P < 0.0001$) log CFU reduction of *S. enterica* (5.41 CFU/g) versus the control (4.44 CFU/g) and all treatments achieved greater than 6-log CFU/g reduction of *E. coli* O157:H7.

Conclusion

Including raisins reduces *S. enterica* loads versus the control and all formulations exceeded a 6.0 log CFU/g reduction of *E. coli* O157:H7, in a restructured beef jerky product. A restructured jerky product could provide butchers with an additional marketing avenue and opportunity to reduce waste and pathogen loads in beef. Ethiopian consumers would also have an option for a commercially available, shelf-stable product which could provide additional protein to their diet that is easy to store and transport.