

# CONTROL OF *E. COLI* O157:H7 AND *SALMONELLA* DURING PRODUCTION OF ETHIOPIAN QWANTA

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## I. OBJECTIVES

Animal-sourced foods (ASF), such as meat, can provide nutrients that are beneficial for physical and cognitive development. When access to ASF is limited, and general nutrition is poor, the safety of food is particularly important. Ethiopia has a 37% incidence rate of stunting in children, and diarrhea is the leading cause of childhood mortality. Improving meat preservation techniques has the potential to improve both availability and safety of ASF. Ethiopian qwanta is a whole muscle dried beef product made utilizing an intricate cutting technique to create elongated, thin strips of meat that are then seasoned and air dried. The objective of this study was to investigate the potential food safety risks associated with consumption of traditional Ethiopian qwanta.

## II. MATERIALS AND METHODS

Twenty-gram strips were cut from top round (<2% fat), seasoned with a mixture of salt and berbere, an Ethiopian spice from one of 2 sources. Strips were then inoculated with 5 serotypes of *Salmonella enterica* (Anatum, Dublin, Newport, Saintpaul, Typhimurium) and 3 strains of *Escherichia coli* O157:H7. Chambers were created to mimic the ambient air-drying process; 2 ventilation rates—2,600 exchanges/h and 3,700 exchanges/h—were evaluated to simulate 2 different-sized drying rooms. Chambers were at an ambient temperature of 22.2°C ± 1.2°C with a relative humidity of 60.8%–66.9%. Qwanta strips remained suspended in these chambers for 1 to 7 d; samples were plated for enumeration on days 0, 1, 4, and 7 post-inoculation and were weighed at the start and finish of the drying period. Microbial results are based on the wet weight of samples.

## III. RESULTS

Aside from water activity (day × ventilation rate;  $P=0.0030$ ), ventilation rate and berbere source showed no detectable interaction ( $P>0.32$ ) on any parameter. Qwanta lost ( $P<0.001$ ) 53.4%, 65.4%, and 65.9% of weight on day 1, 4, and 7, respectively, compared to day 0. Water activity decreased faster ( $P<0.001$ ) at higher ventilation rate on day 1 (0.76 vs.  $0.88 \pm 0.015$ ) but resolved at a similar ( $P=0.69$ ) water activity by day 7 (0.53 vs.  $0.54 \pm 0.018$ ). The drying process resulted in  $3.5 \pm 0.11$  log CFU/g reduction in *E. coli* O157:H7 and a  $1.7 \pm 0.23$  log CFU/g reduction in *S. enterica* by day 7 ( $<0.0001$ ).

## IV. CONCLUSION

Air drying without heat treatment does significantly reduce pathogen load in qwanta, although substantial improvement is still needed. Additional processing interventions should be utilized to further mitigate risks.

Keywords: dehydration, dried beef, international development, risk mitigation, *Salmonella* reduction

