Critical Limit Summary for Turkey Jerky-Making Process Lethality

Researchers at the USDA's Eastern Regional Research Center in Wyndmoor, PA have recently completed a study on the lethality of several methods for processing whole-muscle turkey jerky. A brief summary of the paper is provided below. *Note: the results of this study are generalizable to chicken and other whole-muscle poultry products.

Background: Processing whole-muscle turkey into jerky is intended to make a dry product with desirable texture and shelf-stability. However, the drying of the product may keep the heat in the process from adequately killing pathogens on the product surface. This may happen for two reasons: 1) evaporative cooling on the surface of the turkey strip keeps it from getting hot enough, and 2) early stages in heating may make the pathogens more heat-resistant so that they survive the later stages of the process.

Research Study: Turkey strips were inoculated on one side with either *Salmonella* Typhimurium, *Escherichia coli* O157:H7, or *Listeria monoctyogenes*. Some strips were then marinated (15 min at 4°C in a pH 5.5 marinade at a level of 18%); others were not marinated. The strips were then paced on wire racks in a commercial smokehouse. The smokehouse was operated with constant hickory smoke, dampers completely open, and the fan at a rate resulting in 40-50 air exchanges per minute. The dry-bulb temperature of the smokehouse was set at either 165°F or 180°F. The dry-bulb temperature and % Relative Humidity in the smokehouse were continuously monitored. The number of *Salmonella* Typhimurium, *E. coli* O157:H7, and *L. monocytogenes* cells were determined at the start and end of the process.

Research Results: USDA Compliance Guidelines for Meat and Poultry Jerky (2012) indicate that the lethality treatment for poultry jerky must achieve at least a 7-log reduction of *Salmonella* spp.; a 3-log reduction of *L. monocytogenes* is also required. A lethality of 7-logs was achieved for each pathogen in marinated and non-marinated strips processed at a dry-bulb temperature of at least 165°F for at least 3.5 h, or at a dry-bulb temperature of at least 180°F for at least 2.5 h. The initial Relative Humidity was at least 49% for both processes; the final Relative Humidity was at least 30% for 165°F processes and at least 24% for 180°F processes.

Validated Critical Limits: This study validates two different processes for the manufacture of whole-muscle turkey jerky. The critical limits are:

1) dry-bulb temperature of at least 165°F for at least 3.5 h, initial %RH of at least 49 and final %RH of at least 30
2) dry-bulb temperature of at least 180°F for at least 2.5 h, initial %RH of at least 49 and final %RH of at least 24.

NOTE: The addition of smoke in a heat process (such as this) is <u>not</u> a critical parameter.

A. C. S. Porto-Fett , J. E. Call , C.-A. Hwang , V. Juneja , S. Ingham , B. Ingham , and J. B. Luchansky. 2009. Validation of commercial processes for inactivation of Escherichia coli O157:H7, Salmonella Typhimurium, and Listeria monocytogenes on the surface of whole-muscle turkey jerky. *Poultry Science.* 88 :1275–1281.
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