
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. The results of this study have been submitted for potential publication in a peer-reviewed scientific journal. A brief summary of the paper is provided below.

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 monocytogenes*. Some strips were then marinated (15 min 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: A lethality of at least 5 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 2.5 h or at a dry-bulb temperature of at least 180°F for at least 1.5 h. However, in order to make a shelf-stable product that met USDA jerky labeling guidelines, minimum process times of 3.5 h at 165°F and 2.5 h at 180°F must be used. The initial Relative Humidity was at least 49% and 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.

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