Validation of Ground-and-Formed Beef Jerky Processing Lethality Using Commercial Lactic Acid Bacteria Starter Cultures
Alena G. Borowski, Steven C. Ingham, Barbara H. Ingham
University of Wisconsin-Madison

Introduction:
- Popularity of jerky products has increased substantially due to the low-carb diet trend, experiencing a 147% increase in sales between 1997 and 2002 (7).
- Outbreaks of salmonellosis, linked to beef jerky, have been occurring for the past 40 years and E. coli O157:H7 outbreaks have been linked to both beef and venison jerky (1).
- Inherent characteristics of the jerky manufacturing process lead to the increased possibility of producing an unsafe product.
- Low-temperature drying for long periods of time decreases the degree of pathogen destruction.
- Evaporative cooling on the surface of jerky strips decreases the temperature to which any contaminating organisms are exposed.
- Heat-resistance of Salmonella serovars and E. coli O157:H7 increases as the water activity (a_w) of the product decreases.
- Previous research has not clearly defined the processing conditions required to achieve adequate pathogen lethality in jerky manufacture (2,3,4,5), while conceding that recommended processes often yield a poor quality product (6).

Materials and Methods:
- Inoculum Preparation: Strips of lean ground beef placed in 3.78 L Ziploc bags and seasoned by hand mixing with “Barbecue” seasoning (Excalibur Seasoning Company, Pekin, IL) according to manufacturer’s directions.
- Jerky Processing Conditions: Jerky samples were removed from the dehydrator or smokehouse at designated sampling times throughout each process.
- Results and Discussion: Jerky process schedules when a pathogen reduction was < 5.0 log CFU and LAB reduction was > 5.0 log CFU were obtained in 3% of samples (n=600).

Objective:
- To validate the use of a commercial LAB pathogen surrogate for evaluating the lethality of ground-and-formed beef jerky processes. It is important to note that it was NOT the goal of the study to validate any of the processes used but rather to expose the LABs to a variety of processing conditions to ensure the LABs exhibited greater, but comparable, heat resistance to Salmonella spp. and E. coli O157:H7.

Conclusions:
- Small meat processors wishing to evaluate the safety of their manufacturing process for ground-and-formed jerky can use readily available LABs and avoid the expense and hazard of challenge studies. This method, process evaluation allows for variation in finished product quality and ultimately maintains the artisinal quality of jerky produced by small and very small meat processors.

References:
2. Farkas, M.M., and J.J. Rasmussen. 1996. Validation of RapidPak for allowing us access to their research facility. This project was funded by the USDA, Cooperative State Research, Education & Extension Service, National Food Safety Initiative.
4. P. acidilactici, a gram-positive endospore-forming LAB. A value of 0.5 CFU was assigned when the lowest dilution had no countable colonies.
5. Jerky strips were removed from the dehydrator or smokehouse at designated sampling time throughout each process.
6. Jerky process schedules when a pathogen reduction was < 5.0 log CFU and LAB reduction was > 5.0 log CFU were obtained in 3% of samples (n=600).
7. Small meat processors wishing to evaluate the safety of their manufacturing process for ground-and-formed jerky can use readily available LABs and avoid the expense and hazard of challenge studies. This method, process evaluation allows for variation in finished product quality and ultimately maintains the artisinal quality of jerky produced by small and very small meat processors.

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