

## **CRITICAL SUMMARY: Attaining enough lethality when making Soudjouk and related fermented semi-dry sausage products**

**Background:** Soudjouk and related products are made from ground meat, spices, and curing compounds. The products are fermented (preferably using an added starter culture and dextrose) and then dried. These traditional products are often not subjected to a heating step. If the product contains beef, then the process must be capable of causing a “5-log” reduction both in the number of *Escherichia coli* O157:H7 cells and the number of *Salmonella* cells. If the products only contain pork, the target pathogen is *Salmonella* but there is no strictly defined lethality target. However, we recommend that the process for pork products be capable of causing a 5-log reduction of *Salmonella* cells.

**Research Study:** Raw ground beef was inoculated with *Salmonella* Typhimurium and *E. coli* O157:H7 and manufactured by the researchers into soudjouk, using fermentation at 75°F and 90 – 95% Relative Humidity, and then drying at 72°F and 80 – 85% Relative Humidity for 72 h. After fermentation and drying, the product was vacuum-packaged and stored at 39, 50 or 72°F for up to 30 days. In a related study, commercial finished soudjouk (made from beef) was surface-inoculated with *Salmonella* Typhimurium and *E. coli* O157:H7, vacuum-packaged, and stored at 39, 50, 72, or 86°F for up to 90 days.

**Research Results:** Two batches of soudjouk made by the researchers had pH, water activity, and % salt values of 5.27, 0.923, 3.02, and 4.81, 0.915, and 2.08. A 5-log reduction in both *Salmonella* and *E. coli* O157:H7 was not achieved in the manufacture and storage of either batch. A greater than 5-log reduction in *Salmonella* was achieved when the pH 4.81, water activity 0.915, and 2.08% salt batch was stored at 72°F for 30 days post-processing (vacuum-packaged). The commercial soudjouk had a pH of 4.97, water activity of 0.850 and contained 3.55% salt. A 5-log reduction of *Salmonella* and *E. coli* O157:H7 was achieved on this product when it was stored at 86°F for 7 days, 72°F for 12 days, or 50°F for 30 days (vacuum packaged).

**Critical Limits Recommended:** Based on this study, the following critical limits can be recommended to attain sufficient destruction of *Salmonella* and *E. coli* O157:H7 in beef fermented, semi-dry sausages:

- pH 4.97 or less
- water activity 0.850 or less
- 3.55 % salt or more
- post-processing storage treatments with at least the temperature and length of one of the following combinations: 86°F for 7 days, 72°F for 12 days, or 50°F for 30 days.

**Reference:** Porto-Fett, A.C.S., C.-A. Hwang, J.E. Call, V.K. Juneja, S.C. Ingham, B.H. Ingham, and J.B. Luchansky. 2008. Viability of multi-strain mixtures of *Listeria monocytogenes*, *Salmonella typhimurium* or *Escherichia coli* O157:H7 inoculated into the batter or onto the surface of a soudjouk-style fermented semi-dry sausage. *Food Microbiology* 25:793-801.

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