

Effects of moisture and temperature on *Salmonella* survivability in different types of rendered fats

Valentina Trinetta, Cassandra Jones, Umut Yucel

Department of Animal Sciences and Industry, Kansas State University, 1424 Claflin Road, Manhattan Kansas, 66506

SIGNIFICANCE AND IMPACT

One of the main uses for rendered fat, a by-product of the agriculture industry, is as ingredient in pet food. Controlling parameters, such as holding temperature, presence of moisture and storage time, which contribute to *Salmonella* spp. harborage may prevent final product contamination and potential foodborne illness in humans through cross-contamination. This research contributes significantly to food safety knowledge related to rendered product use and storage.

ABSTRACT

High moisture levels introduced to fats after the rendering process can lead to *Salmonella* presence and growth. Limited research on strategies to eliminate pathogens in these environments are available. Rendered fat characteristics, such as water activity and fatty acids composition, may contribute to *Salmonella* survivability. The purpose of this research was to evaluate the effects of moisture levels (0%, 0.5%, 1%, and 3%), storage temperatures (48°C and 76°C), and fat characteristics on the growth and survival of *Salmonella* in beef tallow, white grease and poultry fat samples. Samples were inoculated with a high (~10⁸ CFU/mL) and a low (~10⁵ CFU/mL) *Salmonella* cocktail (*S. Sentfenberg*, *S. Newport*, *S. Thompson* and *S. Infantis*). Samples were stored for up to 5 days at 48 and 76 °C. Remaining population was evaluated daily with and without enrichment step. Death rates were calculated using Weibull model for each temperature and moisture level. Only temperature had a significant effect ($P < 0.05$) on *Salmonella* inactivation, while no significant effect between moisture and/or inoculum level were observed. When all products were challenged at 76 °C, counts were below detectable limits after 6 hours. At 48°C a progressive decline in *Salmonella* population was observed within 3 days for both beef tallow and white grease when high inoculum was used for the challenge study. *Salmonella* was below detectable limit within 4 days for both fat types when a low inoculum was instead applied. This research identified the effect of moisture and temperature in rendered fat samples contaminated with *Salmonella* and underlined the need to use time-moisture-temperature data to minimize microbial growth during transportation and storage.