Microbial Challenge Study to Determine the Lethality of Thermal Processing Parameters on Resistant Spores of *Bacillus Amyloliquefaciens* and *Clostridium Sporogenes* in Vacuum-Packed RTE Meat Products

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Abstract

Thermal processing remains the most relevant preservation methods in the processed meat industry. The major public health concern about RTE meat products is the presence of bacteria endospores and their potential to survive during shelf-life. This is important because endospores are highly resistant to food processing technologies and may cause foodborne illnesses or fatalities. Hence, challenge study was conducted on resistant spores of *Bacillus amyloliquefaciens* and *Clostridium sporogenes* in RTE beef burger patties and chicken wings, to determine the lethality and compliance of the thermal processing parameters used by the food industry to required standard of 5 log inactivation. The raw meat products were inoculated with spores of *B. amyloliquefaciens* and *C. sporogenes* at 6 and 3 log CFU/g respectively, before cooking in a spiral oven having two heating zones, set at 94/90°C for 15 min and 180/155°C for 21.5 min for the beef burger patties and chicken wings, respectively. After cooking, the spore count was enumerated to estimate the level of spore inactivation. The cooking parameters used for the beef burger patties was ineffective on the spores of *C. sporogenes*, as 3 log CFU/g of the spores was still enumerated in the beef burger patties after cooking. On the other hand, the spores of the *C. sporogenes* was significantly ($p \leq 0.05$) inactivated by 1.28 log CFU/g in the chicken wings. Furthermore, a significant ($p \leq 0.05$) log reduction of *B. amyloliquefaciens* by 0.49 and 1.84 was observed in the burger patties and chicken wings, respectively. Results of this study showed that the cooking parameters used in this study for the beef burger patties and chicken wings was unable to inactivate spores of *B. amyloliquefaciens* and *C. sporogenes* to an acceptable level of 5-log reduction, required for commercial sterility for heat treatment against *C. sporogenes* spores. Further studies on the effect of the treatment on the physiology of the spores will be conducted by performing flow cytometry, TEM, SEM, and FTIR analyses. This will enable better understanding of the spores for application of adequate intervention method needed to achieve the required bacteria spore inactivation in these products.

Biography: Arinola Olaonipekun

Arinola Olaonipekun is a MSc graduate of Food Science and a current PhD student at the Department of Consumer and Food Sciences, under the supervision of Prof. Elna Buys. Her area of expertise is in Food Safety, Predictive Modeling, conducting challenge studies and validation of food safety control measures. She also focusses on application of novel technologies and different intervention methods that can assist

the food industry to ensure production of safe food products. She has worked with different bacteria pathogens and spores.