Nene Meltem Keklik, J Food Process Technol 2016, 7:11(Suppl)
http://dx.doi.org/10.4172/2157-7110.C1.053

Modeling the inactivation of *Escherichia coli* O157:H7 on Turkish style sausage (sucuk) exposed to pulsed UV light

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Escherichia coli O157:H7, an enterohemorrhagic *E. coli* (EHEC), is a highly pathogenic microorganism which causes hemorrhagic colitis and hemolytic uremic syndrome in infected humans. Ruminants, especially cattle, are known to be a major reservoir of EHEC. A substantial number of foodborne disease outbreaks related to *E. coli* O157:H7 has been associated with the consumption of meat products contaminated due to improper processing and handling of meat. Pulsed UV light (PUV) is a potential technology for the post-processing surface decontamination of meat products. PUV does not involve chemicals, water, ionizing radiation or heat (for short treatment times) and can be applied to food with or without package. Although the inactivation kinetics of microorganisms using PUV has been studied by a number of researchers, the information in this area is still limited. Accurate estimation of microbial survival rates by using mathematical models would help successful adaptation of this technology to industrial applications. In this study, the inactivation kinetics of *Escherichia coli* O157:H7 on sucuk, a Turkish style dry-fermented sausage made from raw minced beef, was investigated. *E. coli* O157:H7 inoculated onto the surface of sucuk encased in collagen was exposed to pulsed UV light for up to 60 seconds at varying distances (5, 8 and 13 cm) from the quartz window of the xenon lamp in a pulsed UV-light system. The survival curve obtained at each distance exhibited an upward concavity. Accordingly, three mathematical models, log-logistic, modified Gompertz, and Weibull, were used to estimate the inactivation rates. Non-linear regression was performed to determine the model parameters. The goodness-of-fit of models was determined using root mean square error (RMSE), accuracy factor (A_f) and regression coefficient (R_2). Modified Gompertz model yielded the highest goodness-of-fit followed by log-logistic model and Weibull model, respectively. Modified Gompertz model produced RMSE values of 0.304-0.464, A_f values of 0.937-0.985, and R^2 values of 0.969-0.981. The findings of this study demonstrated that the inactivation of *E. coli* O157:H7 on sucuk encased in collagen exposed to PUV follows a non-linear (upward concave) pattern and can be predicted using modified Gompertz model.

Biography

Nene Meltem Keklik is an Assistant Professor in the Department of Food Engineering at Cumhuriyet University in Turkey, where she has been a faculty member since 2010. She completed her PhD at the Pennsylvania State University and her undergraduate and MSc studies at Gaziantep University. Her research interests include emerging food technologies, unit operations in food engineering and kinetic modeling of microbial inactivation. She has recently focused on new product development and synergistic effect of hurdles. She is currently teaching 'Unit operations', 'Mass transfer', 'Reaction kinetics in food engineering', and 'New product development and optimization' as undergraduate courses; and 'Kinetic modeling in food engineering', 'Optimization in food engineering', 'Non-thermal food preservation methods', and 'Detection and characterization of foodborne pathogens' as graduate courses.

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