Meetings International

18th International Conference on

FOOD MICROBIOLOGY

April 27-28, 2023 | Rome, Italy

Development of a Radio-Frequency Technology for the Decontamination of Salmonella from Timothy Hay

Deandrae L. W. Smith
Purdue University, West Lafayette, Indiana

Introduction: Thermal destruction of microorganisms is the most promising decontamination method.

Purpose: The objectives of this research were to; Investigate the efficacy of RF heating on the decontamination of Salmonella enterica and Enterococcus faecium NRRL B-2354 in Timothy hay; Evaluate the suitability of E. faecium as a surrogate of Salmonella in Timothy hay during RF treatment; and Assess the physicochemical changes after RF treatment on the Timothy hay on vitamins, amino acids, fatty acids, and trace minerals.

Methods: A pilot-scale parallel-plate RF heating system (6 kW, 27.12 MHz) was used to conduct this study. Timothy Hay was procured from a pet food manufacturing plant in Lincoln, Nebraska, at an initial MC of 7% to 9% (wet basis). Timothy hay samples (150 g) were inoculated with either a cocktail containing five serotypes of Salmonella or a broth of Enterococcus faecium then incubated at 37 ◦C for 24 ± 2 h. Timothy hay samples were exposed to RF energy for 165, 175, 185, and 195 s.

Results: After RF treatments, Salmonella loads were reduced to 5.80 ± 0.24, 4.00 ± 0.27, 1.42 ± 2.01 Log CFU/g and below the detection level after RF treatment for 195 s. At 165 and 175 s of RF treatments, the E. faecium loads (mean ± SD log CFU/g) were reduced to 7.50 ± 0.14 and 6.39 ± 0.31 log CFU/g and below the detection level at 185 and 195 s. There was complete decontamination at 185 and 195 s. There were no statistically significant changes in the Iron, Vitamin A, or Amino Acid responses because of increasing RF treatment duration. However, Sodium levels increased, and Potassium and Calcium levels decreased in response to the increasing RF treatment durations.

Significance: The study demonstrated a non-chemical approach to decontaminating Salmonella and its surrogate, Enterococcus faecium, from low-moisture foods such as pet foods.

Biography

Dr. Deandrae Smith grew up on the island of Nassau in The Bahamas. One in every ten people lives below the poverty line in this Caribbean nation and often experiences severe food insecurity. Out of this awareness, Dr. Smith uses her research to advocate for secure, sufficient, safe, and nutritious food sources, a mission at the center of her career as a Food Engineer. Dr. Smith has 10+ years of experience in applied research in food safety and quality, thermal process engineering, and product development around food insecurity.

DLWSmith@purdue.edu