IMAGING SPECTROMETRY FOR DETECTING FECES AND INGESTA ON POULTRY CARCASSES

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Imaging spectrometry or hyperspectral imaging is a recent development that makes possible quantitative and qualitative measurement for food quality and safety. This paper presents the research results that a hyperspectral imaging system can be used effectively for detecting fecal (from duodenum, cecum, and colon) and ingesta contamination on poultry carcasses from the different feed meals (wheat, milo, and corn with soybean) for poultry safety inspection. A hyperspectral imaging system has been developed and tested for the identification of fecal and ingesta surface contamination on poultry carcasses. Hypercube image data including both spectral and spatial domains between 430 and 900 nm were acquired from poultry carcasses with fecal and ingesta contamination. A transportable hyperspectral imaging system including fiber optically fabricated line lights, motorized lens control for line scans, and hypercube image data from contaminated carcasses with different feeds are presented. Calibration method of a hyperspectral imaging system is demonstrated using different lighting sources and reflectance panels. Principal Component and Minimum Noise Fraction transformations will be discussed to characterize hyperspectral images and further image processing algorithms such as image band ratio of dual-wavelength images and its histogram stretching with thresholding process will be demonstrated to identify fecal and ingesta materials on poultry carcasses. This algorithm could be further applied for real-time classification of fecal and ingesta contamination on poultry carcasses in the poultry processing line.