

An alternative and innovative technique for rapid and accurate prediction of lightness of Japanese cooked pork sausages

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Statement of the Problem: Lightness can greatly influence the freshness of the sausages. A precise, rapid, and non-contact analytical methods or tools is highly demanded to quantify the colour. Hyperspectral imaging (HSI) is an emerging technique which integrates spectroscopy and imaging to obtain the spectral and spatial information simultaneously. However, lightness prediction in cooked sausages using HSI has not yet been exploited. The objective was to develop a quantitative model between the spectral data and lightness values of cooked big Japanese sausages stored with different days based on partial least squares regression (PLSR).

Methodology & Theoretical Orientation: Big cooked Japanese pork sausage slice (117 samples; diameter: 8.86 ± 0.37 cm; thickness: 0.12 ± 0.02 cm; mass: 6.85 ± 0.12 g) were purchased and randomly divided into 7 groups for up to 57 d storage. Image acquisition was conducted by the HSI system with the wavelength range of 380-1000 nm. The specific processing was illustrated in Figure 1. Pre-treatment methods of spectra, such as normalization (N), multiplicative scatter correction (MSC), standard normal variate (SNV), first derivative (1st D), and second derivative (2nd D) of the spectra, were conducted prior to calibration modeling. The model precision and predictive capabilities were evaluated by the coefficients of determination (R_c^2 for calibration and R_p^2 for prediction) and root mean square error (RMSEC for calibration and RMSEP for prediction)

Findings: 10 wavelengths (390, 400, 420, 560, 685, 830, 930, 965, 980 and 995) were selected as important wavelengths. Models derived from raw spectra ($R_c^2=0.68$; RMSEC=0.85; $R_p^2=0.42$; RMSEP=1.19) showed similarly performance compared to those with other pre-treated spectra. A gentle better calibration result was obtained in N-PLSR model, with R_c^2 of 0.69 with RMSEC of 0.83.

Conclusion & Significance: The pre-treatment of SNV-PLSR and MSC-PLSR showed slight enhancement in the prediction dataset.

Biography

Chao-Hui Feng has her expertise in modifying natural hog casing by using surfactant solution and lactic acid, applying innovative cooling method (immersion vacuum cooling) to packaged pork ham and Irish cooked sausages, to improve the cooling rate and reduce the cooling loss without compromising the quality of the meat products and estimating the meat quality by using hyperspectral imaging. With regard to her postdoctoral work which is financial supported under the Japan Society for the promotion of science (No. P16104) and a grant-in-aid for scientific research, she evaluated the quality and safety concerns of processed meat based on hyperspectral analysis. Up to now, she has 11 SCI papers as a first author accepted to be published in the peer-reviewed international journals

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