_____ ABSTRACT _____

Evaluation of Fatty Acid Profile of Wagyu Beef by ATR-FTIR Spectroscopy

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Japanese black Wagyu beef has its characteristics of fatty well-marbled texture, flavor, and tenderness which are affected by fatty acid composition. The aim of this study was to develop an analytical method for evaluating the fatty acid profile of Wagyu beef by Fourier transform infrared (FTIR) spectroscopy. In the current study, attenuated total reflection–FTIR (ATR-FTIR) spectroscopy and gas chromatography (GC) were applied to the fat tissues, and the solvent-extracted fats which were sampled from subcutaneous, inter- and intramuscular fat tissues. Results of GC analysis showed that monounsaturated fatty acids (MUFA) content became larger in the order of intramuscular, intermuscular, and subcutaneous fats, and saturated fatty acids (SFA) became smaller in the same order. Subcutaneous fat could be discriminated from inter- and intramuscular fats on the basis of fatty acid composition by principal component analysis. The ATR-FTIR analysis revealed that the shift of the peak positions of alkene C–H stretching vibration at around $3,006 \text{ cm}^{-1}$ occurred depending on the unsaturation degree of fatty acids in beef fat. Partial least squares (PLS) regression analysis with leave-one-out cross-validation was applied to the combined regions of 2,800–3,050 and $1,000–1,500 \text{ cm}^{-1}$ for the fat tissues and the extracted fats. The correlation coefficients of the PLS validation models predicting the content of the MUFA and SFA for solvent-extracted fats were higher than those for fat tissues, and the coefficients (R^2) of determination more than 0.873 were obtained for solvent-extracted fats and 0.522 for fat tissues.