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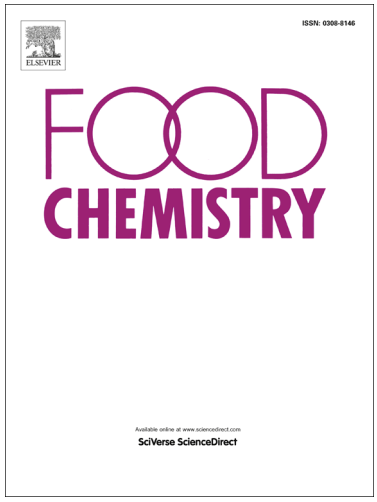

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Thien nguyen, Sungchul Kim, Jae Gwan Kim

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ACCEPTED MANUSCRIPT

Diffuse reflectance spectroscopy to quantify the met-myoglobin proportion and meat oxygenation inside of pork and beef

Thien NGUYEN[a, #], Sungchul KIM[a,#], Jae Gwan KIM[a,b,*]
[a]Department of Biomedical Science and Engineering, [b]School of Electrical Engineering and Computer Science, Gwangju Institute of Science and Technology, 123 Cheomdangwagi-ro, Buk-gu, Gwangju, The Republic of Korea, 61005

[#]Authors have equal contribution to this work

Email list: 1, Thien Nguyen: *thien@gist.ac.kr*; 2, Sungchul Kim: *sungchulkim@gist.ac.kr*

**Corresponding author: email: jaekim@gist.ac.kr, telephone: +8262 715 2220*

Abstract: The potential of diffuse reflectance spectroscopy (DRS) to quantify the met-myoglobin (met-Mb) proportion and meat oxygenation inside of pork and beef was examined. First, reflection spectra were obtained from pork (n = 52) and beef (n = 43) samples under fresh and stored conditions. Second, the DRS algorithm was applied to the reflectance spectra to calculate the met-Mb proportion and oxygenation of the meat. Lastly, a regression model was developed showing the change in the met-Mb proportion and oxygenation during met-Mb formation and degradation. A linear relationship existed between the DRS-based computed data and the known met-Mb proportion with a high correlation (R^2 = 0.9999) and a low error (0.86%). Measurement of the meat samples revealed a linear increment of the met-Mb proportion (R^2 = 0.77) and a quadratic change in the oxygenation (R^2 = 0.44) during the met-Mb formation process. This study demonstrated the ability of DRS to quantitatively analyze the relative content of myoglobin derivatives in both pork and beef.

Keywords: fitting model; photon diffusion theory; regression model; linear model; met-myoglobin formation process; met-myoglobin degradation process.

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