Abstract Submission

Dairy and Food

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Ft-Nir Spectroscopy To Study Beef Storage In Master Bag Low-Oxygen Packaging System

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What is your preferred presentation method?: Oral presentation

Abstract Body: In order to face high levels of meat wastage, occurring especially at the distribution and consumption stages, food industry envisions new shelf life extension strategies, together with reliable, non-destructive and fast methodologies for product decay monitoring. Therefore, the aim of this work was to assess the reliability of NIR spectroscopy in discriminating storage times of meat packed in low-oxygen systems, recognised as case-ready methods for the shelf life extension of red meat.

To the aim, 48 beef meat slices, distributed in 24 trays wrapped in stretched PVC, were individually inserted inside barrier master bags containing O_2 scavengers and low-O_2 modified atmosphere (MA). Each master bag was stored in darkness at 0±1 °C for different times (6, 8, 13 and 15 days). After master bag opening, trays were displayed at 4±2°C under light exposure up to 48h. Wrapped beef slices were analysed by a fibre optic connected to a FT-NIR spectrometer (MPA, Bruker Optics) immediately after master bag opening and during display life. The obtained dataset (288 spectra), after spectral pre-treatments, was subjected to PCA and LDA by means of MatLab 2016a and V-PARVUS.

PCA permitted to distinguish fresh meat from samples exposed to low-O_2 MA, no matter the time spent in the master bags. Moreover, the explorative approach unearthed differences ascribable to anoxic environment storage. Thus, after variable selection by SELECT algorithm, LDA was applied in order to classify samples according to storage times in master bags. Correct classification rates in prediction higher than 87.5% were obtained when considering two classes (1= 6 and 8 days; 2= 13 and 15 days).

Concerning meat display under light, LDA classification models were separately calculated for the two considered classes of anoxic storage time, showing global correct classification rates in calibration, cross-validation and prediction higher than 81%, 72% and 68%, respectively.

In conclusion, the use of FT-NIR spectroscopy looks promising to estimate simultaneously the anoxic storage time and the deterioration of meat quality attributes throughout display life, thus providing the food industry with an effective packaging system together with a reliable monitoring approach intended for meat wastage reduction.

Keywords: beef meat, FT-NIR, LDA, low-oxygen packaging system, PCA, shelf life