FT-IR imaging as a method to monitor denaturation processes in meat

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Tenderness plays an important role for consumer's acceptance of meat. For the meat industry it is a problem to provide consumers with tender meat, since skeletal muscles exhibit great variations in textural properties between different animals as well as within the same animal. Differences in the biochemical composition of muscles that are essential for the tenderness and mechanisms that contribute to the textural properties of meat are far from being fully understood. Muscles are composed of myofibers and connective tissue. Studies on both compounds during ageing or heating of meat, which is used to increase tenderness, have shown that both components affect the quality of meat (1, 2).

Fourier transform infrared (FT-IR) imaging, employing focal plane array (FPA) detectors is a relatively new, but promising technique for rapid food analysis. In contrast to conventional FT-IR microscopy, the FPA assembly allows the simultaneous collection of spectra at 4096 pixels enabling the rapid spectroscopic and spatial discrimination of a sample area. In a pilot study, FT-IR imaging was used to detect the denaturation process during four different heating temperatures (raw, 40 °C, 60 °C and 70 °C) spatially resolved in beef cryosections from two different muscles (*longissimus dorsi* and *semimembranosus*). The infrared images were recorded from regions in the tissue that contained both myofibers and connective tissue. First results show that infrared imaging can be used to monitor the denaturation process in both tissues. Interestingly, the connective tissue spectra showed a higher β-sheet content indicating a more extensive denaturation in this tissue. This preliminary result combined with the speed and minimal sample handling indicates that FT-IR imaging might provide a new powerful tool in food analysis in the future.

References:

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