Quality assessment of butter cookies applying multispectral imaging

A method for characterization of butter cookie quality by assessing the surface browning and water content using multispectral images is presented. Based on evaluations of the browning of butter cookies, cookies were manually divided into groups. From this categorization, reference values were calculated for a statistical prediction model correlating multispectral images with a browning score. The browning score is calculated as a function of oven temperature and baking time. It is presented as a quadratic response surface. The investigated process window was the intervals 4–16 min and 160–200°C in a forced convection electrically heated oven. In addition to the browning score, a model for predicting the average water content based on the same images is presented. This shows how multispectral images of butter cookies may be used for the assessment of different quality parameters. Statistical analysis showed that the most significant wavelengths for browning predictions were in the interval 400–700 nm and the wavelengths significant for water prediction were primarily located in the near-infrared spectrum. The water prediction model was found to correctly estimate the average water content with an absolute error of 0.22%. From the images it was also possible to follow the browning and drying propagation from the cookie edge toward the center.

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