Analysis of Baking Products

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The bakery sector of the cereals processing industry is one in which near-infrared (NIR) technology has been applied but in which its use is not widespread. This is in marked contrast to the situation in the milling sector, where raw materials, processes, and products are all monitored by NIR. The difference in use between sectors is partly due to the differences in the quality measures used. For milling, most properties of interest may be traced back to a fundamental biochemical attribute that is quantifiable using spectroscopic means. Although this is essentially true for bakery raw materials, the composition of final bakery products is not as interesting as other measures of quality. This is partly due to the baking process in which weighed ingredients are combined in a controlled process so that compositional variation is minimized. It is also due to the perceived quality attributes of, for example, a loaf of bread. By this final stage of production, the protein content is relatively unimportant when compared with loaf volume or crumb fineness, neither of which easily lends itself to NIR measurement in the final product. Recent work has shown that NIR can be used to assess how raw ingredients and processes affect such parameters. This chapter will assess the raw materials for bakery processes and how these may be assessed by NIR. Table 17–1 provides a list of relevant research. Near-infrared spectroscopy, as applied to processing technology, will then be described, followed by a review of the assessment of some finished products by NIR. The recent developments in computing power and instrument design now allow measurements that previously could only be imagined, so this chapter may be seen as a taste of what is to come for the baking sector as NIR adapts to meet its needs.

INGREDIENTS AND ATTRIBUTES

Of the 413 million tonnes of common wheat (Triticum aestivum L.) produced world-wide for food purposes (37), approximately 40% is processed for flour, the prime ingredient for breadmaking and other baked products. Careful control of such high volume processes reduces waste and maximizes consistency of quality. Near-infrared analysis, both off and on-line, is one tool that can play an important part in addressing quality factors for baked products. Other major food uses of wheat include pasta (mainly T. durum Desf.), pastry, biscuits, cakes, snacks and confectionery, and the manufacture of starch and starch products.