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Technical Paper

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EVALUATING THE QUALITY AND TEXTURE OF BAKERY PRODUCTS

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Evaluating the Quality and Texture of Baked Products

The measurement of product quality is important to bakers for many reasons, not least of which are ensuring product consistency and the evaluation of texture which are both key to customer satisfaction. The term 'baked products' covers a wide range of texture and eating qualities from tender and soft-eating cakes, through firm and chewy bread textures to hard and crisp cookies and biscuits. Consumers have a set of common expectations for the various sub-groups of bakery products based on traditional textures (and flavours but this aspect of product quality is not covered in this Technical Paper) which need to be met to ensure product acceptance. Increasingly baked products reach consumers via a retailer who will be using some form of product quality template which bakers must match, and objective measurement of product quality needs to be obtained to check on production consistency.

Because the intrinsic characteristics of bakery products vary, so do the specific methods which will be used to obtain quality information. Some of the evaluation methods will be relatively simple, while other will require more sophisticated equipment and methods. Quality assessments have traditionally been carried out by removing samples from production for evaluation, often in a separate quality control check environment, but increasingly methods are becoming available for taking relevant measurements online with integration of data in process control.

This Technical Paper aims to provide an introduction as to how to assess the qualities and textures of baked products.

Weight (mass) and Moisture

The most basic quality measures are associated with product weight and moisture content, often because there is a regulatory need (such as with bread) but also because the data are indicative of important process changes and are strongly related to other important product attributes (for example, moisture content has a major impact on product eating qualities).

Offline the measurement of product weight is easily carried out simply by weighing the final product on a calibrated balance. Online weight measurement systems are available with the ability to reject automatically those products which are below or above the appropriate weight.

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A basic measure of product moisture content can be obtained using weight loss during processing (usually baking and cooling). As the moisture content of the recipe can be readily calculated and the weight of individual units taken from the mass of dough or batter is known, then it follows that the mass of water in an individual unprocessed unit can be calculated. Changes in the mass of individual products during baking and cooling are usually as the result of the evaporation of moisture and so the loss in weight can be used to estimate the final product moisture content.

Example of Moisture Content Calculation

Ingredient	Mass	% moisture	Mass water
Flour	100	14	14
Sugar	95	0	0
Margarine	30	15	4.5
Whole egg	50	75	12.5
Water	45	100	45
Baking powder	5	0	0
Total	325.0		76.0
Batter moisture		23.4	
Deposit weight (g)	65	23.4	15.2
Baked weight (g)	60	17.0	10.2

The objective measurement of moisture is commonly carried out offline using an oven drying method. The choice of drying method may vary according to the nature of the baked product. For example, the measurement of moisture in sugar and fat-rich products such as cakes, is best carried out at lower temperatures under conditions to which restrict weight losses to moisture alone. Often the moisture content of cakes will be evaluated at temperatures close to or a little below 100°C in an oven running under partial vacuum to remove the moisture.

Near Infra-Red Spectroscopy (NIR) may be used to measure products moisture contents off and online, though its use online may be restricted to products which are fairly uniform in moisture such as some biscuits and cereals. Moisture gradients are present in most products at the end of baking and cooling, which may limit the value of online moisture content measurements.