TEXTURE PROFILE ANALYSIS OF SLICED BREADCRUMBS

TPA was used to measure the texture of commercial sliced bread over a three day period to quantify product staling.

Requirement

A reproducible method was required for the practical assessment of breadcrumb texture as an indicator of product staleness. The method had to take into account a number of variables:

- formulation and composition
- environmental exposure and packaging
- location of the test site on the sample
- manufacturing process
- sample geometry

Solution

The method used is based on a study at Campden and Chorleywood FA in 2002, investigating the standardisation of instrumental texture measurements in baked goods. The parameters of cohesiveness, hardness and springiness are used as reproducible predictors of breadcrumb texture.

Reproducibility was improved through critical selection of samples. Slices were critically selected to eliminate natural variation in product caused by 'dough piece' manufacture and only slices located next to each other were used.

A second study was carried out 3 days later to represent the effect of staling within the sample. Test conditions were repeated from day 1 and comparisons made.

Two slices are presented to the test probe and deformed to 50%.

Three samples are taken from the cross-section of the sliced loaf.

Benefits

Cohesiveness

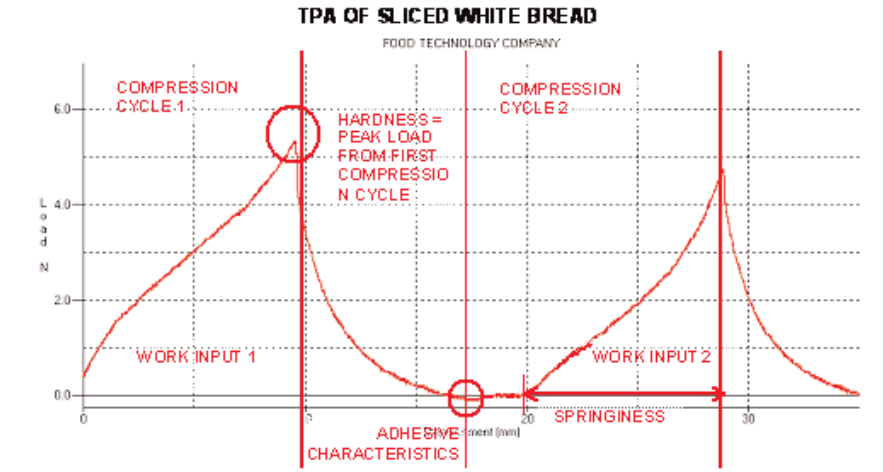
- TPA when effectively applied can provide a reproducible measure of breadcrumb texture.

Springiness

- Instrumental analysis can be used in the optimisation of formulation, packaging and shelf-life.

Hardness

- Breadcrumb measurements can be used as a predictor of process behaviour e.g. firmer textures may improve handling during slicing or automated sandwich manufacture.



Characteristics			
Parameter	FTC System		
	TMS-Pro	TMS-Console	Manual Stand
Hardness	✔	✔	✔
Adhesive Force	✔	✔	
Adhesiveness	✔	✔	
Cohesiveness	✔		
Springiness (Bourne, 1982)	✔		
Springiness Index	✔		

Conclusions

Breadcrumb texture is a soft moist solid foam. When tested to small deformations (particularly when fresh), it exhibits extremely elastic characteristics. As it stales it exhibits a more viscous, non-recoverable behaviour.

The key parameters of cohesiveness and springiness reflect the development of internal bonding within the sample. Hardness is directly related to how hard or soft a sample feels. As the bread becomes staler it increases in hardness, reflecting a decrease in moisture content and an increase in bond strength within the rigid foam.

The parameter of cohesiveness is more complex. Sensorially it is correlated negatively to the rate of breakdown in the mouth and ease of separation in the hand. As bread becomes stale, moisture is lost and the bread is easier to separate in the hand and faster to breakdown in the mouth.

The parameter of springiness decreases as shelf-life increases, due to an increase in the samples' viscous element. All three characteristics objectively quantify the physical properties of breadcrumbs for use in development and routine quality control.

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