TEXTURE APPLICATION NOTE

SPONGE CAKE

APPLICATION

Evaluation of soft sponge cake (Madeira cake)

TEST OBJECTIVE

Quantify the textural properties of the cake as an indicator of baking conditions imposed using Texture profile analysis (TPA)

METHOD

Two commercially available Madeira cakes were assessed using the LFRA texture analyser at three different levels of deformation: 25%, 50%, and 75%. True compression was imposed using a 50.8mm Ø Perspex cylinder probe to samples standardised by cutting cubes of 26 mm x 26 mm x 45 mm from the base of the cake.

PARAMETERS:

HARDNESS:	Peak force in first compression cycle (N)
SPRINGINESS:	Height the food recovers between the end of the of the first and the start of the second.(m)
ADHESIVENESS:	The negative area for the first bite, representing work required to pull the compressing plunger away from the sample. (Joules)
COHESIVENESS:	The ratio of the positive area during the second to that of the first compression cycle
FRACTUBILITY:	The first significant break in the compression cycle (N)
GUMMINESS:	Calculated parameter Hardness x cohesiveness (N) energy required to disintegrate a semi solid food for swallowing.
CHEWINESS:	Calculated parameter Gumminess x springiness (joules) energy required to chew a solid for swallowing (Joules)

TABLE 1
LFRA Settings

MODE:	TPA
TOTAL CYCLES:	2
TRIGGER:	5g
TEST SPEED:	1mm/s
TARGET UNIT:	% Deformation
TARGET VALUE:	25%; 50% and 75%
LOAD CELL:	4.5 kg

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RESULTS

SELECTED CALCULATIONS	PRE MAD 75% TPA_ 3.qdf	PRE MAD 75% TPA_ 1.qdf	PRE MAD 75% TPA_ 2.qdf	PRE MAD TPA 50%_ 1.qdf	PRE MAD TPA 50%_ 2.qdf	PRE MAD TPA 50%_ 3.qdf	mad pre TPA 25%_ 1.qdf	mad pre TPA 25%_ 2.qdf	mad pre TPA 25%_ 3.qdf
Hardness	2484	2431	1957	645	766	723	328	343	291
Cohesiveness	0.226083	0.237671	0.216806	0.410783	0.421709	0.423246	0.598091	0.598088	0.629802
Gumminess	561.59	577.7777	424.2892	264.9554	323.0291	306.0066	196.1737	205.144	183.2724
Apparent modulus	23.24211	25.67393	29.82095	22.93333	25.52464	26.5931	29.15555	33.2606	38.8
Adhesive force	0	-6	-7	-1	-1	-3	-1	0	-2
Adhesiveness	0	-1.875	-3.7875	-0.45	-0.1875	-4.425	-0.7875	0	-2.5125
Springiness	6.869999	7.029999	8.030001	12.11	12.93	12.65	8.4	8.43	8.33
Springiness Index	0.202059	0.206765	0.236176	0.550455	0.587727	0.575	0.763636	0.766364	0.757273
Area cycle 1	22587.79	23719.57	19811.32	6868.125	8876.737	7600.462	2686.8	2749.2	2117.212
Area cycle 2	5106.712	5637.45	4295.212	2821.313	3743.4	3216.863	1606.95	1644.262	1333.425
Quantity fractures	0	0	0	0	0	0	0	0	0
Hardness 1 work done	21402.71	22434.22	18812.4	6084.413	7837.5	6746.025	2133.337	2146.425	1657.238
Hardness 2 work done	4304.138	4795.35	3593.475	2268.675	2991.3	2584.387	1158.525	1175.025	961.2375
Recoverable work done 1	1185.075	1285.35	998.925	783.7125	1039.238	854.4375	553.4625	602.775	459.975
Recoverable work done 2	802.575	842.1	701.7375	552.6375	752.1	632.475	448.425	469.2375	372.1875
Sample length	45	45	45	45	45	45	45	45	45
Deformation @ peak load	34	34	34	22	22	22	11	11	11
Deformation @ final load	34.01	34.01	34.02	22.01	22	22	11	11	11

OBSERVATION:

The loads increase linearly between the 25% and 50% deformation cycles, while a steep increase and change in characteristics is observed at the higher 75% deformation. 50% gives greatest correlation due to elimination of base effects. While base effect is clearly evident at the higher 75% deformation.

CONCLUSION

The method follow traditional principle recognized throughout the food industry as indicators of product texture as a means of sensorial correlation and process control. The method is therefore an invaluable tool for both the product developer and the QC departments as a means of consistent quality production and efficient effective product development.

ISO 9001:2000 CERTIFIED

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