Application manual No. 053

Production: FONDANT

Objective: Comparison of the acceptability (firmness) of four fondant batches by penetration

Type of action: Penetration test

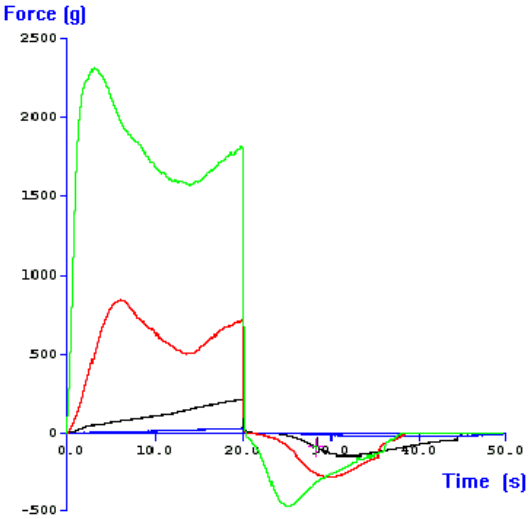
Test mode settings:

Speed	Test mode	Trigger	Target	Hold
2 mm/s	Distance (c)	3 gf	40 mm	0 sec

Accessory:
ϕ4 mm cylinder probe, Platform

Test Set-Up:
Allow sample to equilibrate at controlled temperature e.g. 20C, then remove from the place of storage just prior to testing. Position the sample container centrally under the probe. Commence the penetration test.

Typical plots:



The above curve was produced from the following samples provided with the following comments on quality:
A - Unacceptable (Blue)
B - Unacceptable (Black)
C - Unacceptable (Red)
D - Acceptable (Green)

Observations:
When a 3g surface trigger is attained the probe proceeds to penetrate the sample to a depth of 40mm. At this point (peak height 1 for batches A and B, peak height 2 for batches C and D), the probe returns to its original position. The negative region of the graph, produced on probe return, is an indication of the adhesive property of the fondant or resistance to probe removal. It is quite clear that batches A and B have completely different force profiles to batches C and D.

Batch D is the fondant sample that is deemed to be acceptable in terms of firmness, the force profile indicating that there appears to be a firm crust (shown as *peak 1*) having a softer fondant centre. *Peak 2* is as a result of penetration to a greater depth within this softer fondant.
Batch C possesses a force profile similar in character to batch D but appears to be considerably softer.
Batches A and *B* would deem to be unacceptable due to their rather viscous and sticky nature. A firm crust is not

Data Analysis:
☒Max Force (From 0 to 10 second)

Results

Sample	Peak 1 'Crust Firmness' (+/- S.D.) (g)	Peak 2 'Centre Firmness' (+/- S.D.) (g)
A	-	232.4 +/- 29.9
B	-	38.4 +/- 3.6
C	1006.4 +/- 148.2	833.4 +/-143.7
D	2173.8 +/- 237.8	1965.7 +/- 298.0

Notes:
- When testing, penetration into the same sample container more than once may be required. If doing this, however, consideration should be taken as to the test hole proximity, i.e. penetration must not be carried out too close to neighboring test holes within the same container, and tests must also not be carried out too close to the side walls. It would certainly be preferable to choose a constant testing position within the container as it is noticed that slightly different readings will be obtained when testing at the edge compared to in the centre of the container due to wall support and higher surface elasticity respectively.

- It may be necessary to adjust the penetration depth to a greater or lesser extent. When doing this, consideration should be taken of the base effect of the container, i.e. distance of penetration must not exceed 75% of the depth of the sample. This will subsequently increase both the firmness and resistance of probe withdrawal values. Any values obtained are only relative at the distance to which they are penetrated.

- Storage, packaging and handling of the sample before testing are considered variable conditions under which the sample is tested. It is important to identify these conditions and keep them constant when reporting results of firmness tests for comparison purposes.

- When attempting to optimize test settings it is suggested that the first tests are performed on the hardest samples to anticipate the maximum testing range required and ensure that the force capacity allows testing of all future samples.