Production: CHOCOLATE FILLED CARAMEL

Objective: Comparison of hardness of 5 different caramel sample formulations by penetration

Type of action: Penetration test

Test setting:

Speed	Test mode	Trigger	Target	Hold
0.5 mm/s	Distance (c)	10 gf	15 mm	0 sec

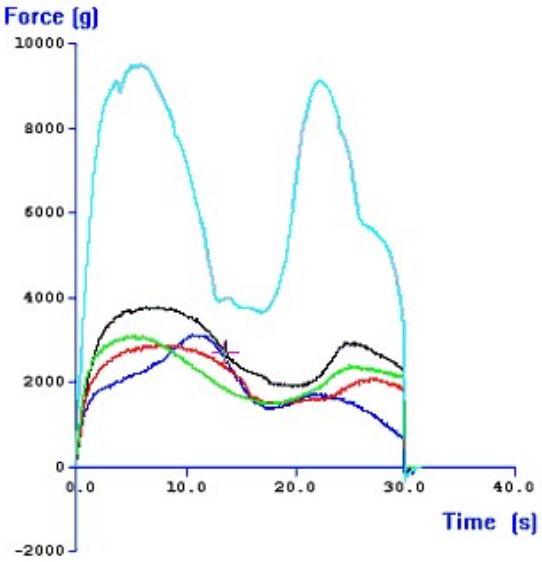
Accessory:

ϕ2 mm cylinder probe, Platform

Sample Preparation:
Allow the samples to equilibrate at a controlled temperature e.g. 20C, then remove from place of storage just prior to testing.

Test Set-Up:
Secure the Heavy Duty Platform on to the machine base. Place the sample on the blank plate of the Heavy Duty Platform and position centrally under the probe. Make sure that the sample is steady and unlikely to rock when penetrated. Commence the penetration test.

Typical plots:



The above curve was produced from 5 different formulations of chocolate filled caramel sweets, tested at 20C.

Observations:
The first peak of each plot corresponds to penetration through the upper caramel coating. Beyond this, the probe proceeds to penetrate through either softer caramel or (at the much lower force values) through the chocolate centre. After this the force increases as the probe begins to penetrate through the lower caramel coating.

Data Analysis:

☒Max Force (From 0 to 10 second)

☒Cursor mark by user find the second peak

☒Travel (Distance from First peak to second peak)

Results

Type	Mean1st Peak Force 'Hardness' (+/- S.D.) (g)	Mean Distance Between Peaks (+/- S.D.) (mm)
A	2898.6 +/- 730.8	6.5 +/- 0.9
B	2992.0 +/- 227.3	8.9 +/- 1.2
C	2954.9 +/- 357.3	8.9 +/- 0.5
D	3767.1 +/- 251.7	8.8 +/- 0.7
E	9997.6 +/- 554.2	8.5 +/- 0.7

Notes:

- It may be necessary to modify the test to penetrate to a lesser/greater depth into the sample. This will subsequently decrease/increase the 'Hardness' values. Any values obtained are only relative at the specified 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 optimise 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.