Production: CHEWING GUM TABLETS (DRAGEES)

Objective: Exterior and interior hardness of 3 brands of chewing gum dragees using a craft knife

Type of action: Cutting test

Test setting:

Speed	Test mode	Trigger	Target	Hold
2 mm/s	Distance (c)	0 gf	9.5 mm	0 sec

Accessory:

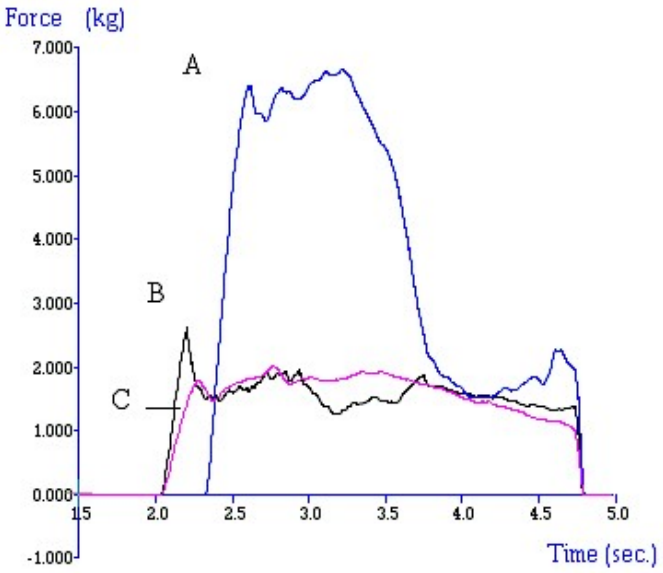
Sharpness test rig, Platform

Test Set-Up:
Insert the cutting block into the Heavy Duty Platform and position it onto the machine base. Attach the knife blade to the load cell carrier and lower it towards the cutting block until it comes close to contact. Calibrate the blade to acknowledge the block as a zero distance by clicking on:

Calibrate Probe: 10mm (selected blade return distance)

Place the sample centrally on the cutting block with the blade perpendicular to the tablet length and commence the test around the mid region of the sample.

Typical plots:



The above curves were produced from cutting through 3 different brands of chewing gum tablets at 20C.

Observations:
The blade approaches the sample and once contacted, a rapid rise in force is observed. The initial breaking of the tablet outer coating is signified by a peak (i.e. the force is seen to drop due to a fracture event). The blade cuts through the coating and then continues to cut through the interior of the tablet which may or may not be softer than the outer coating. The blade returns to its original starting position when its cutting distance of 0.5mm above the cutting block is reached. The first peak force (coating hardness), the area under the curve (total work/energy to cut or toughness) and the force at 7.5mm (interior hardness) can be measured and used as textural indicators. These parameters are most likely to correlate with consumer perceptions of 'first bite' hardness, a high profile textural characteristic of chewing gum tablets.

Sample A is shown to have a considerably harder coating, requires a much greater amount of energy to cut (and therefore would probably be perceived as much tougher to bite) and interior hardness is also much greater (however very variable). Sample B and C on the other hand are relatively similar in exterior and interior hardness although the difference between coating hardness and interior hardness for sample C is so small that the breakage of the coating would not be perceived as so significant than for both of the other samples.

Data Analysis:

☒Max Force

☒Cursor Mark by User (Find the force at 7.5mm)

☒Area (+)

Results

Sample	Mean 1st Peak Force 'Coating Hardness' (+/- S.D.) (kg)	Mean Force at 7.5mm 'Interior Hardness' (+/- S.D.) (kg)	Mean Area 'Work of Cutting/Toughness' (+/- S.D.) (kg s)
A	6.9 +/- 0.6	5.2 +/- 2.0	10.8 +/- 1.1
B	2.2 +/- 0.4	1.4 +/- 0.2	4.0 +/- 0.4
C	1.9 +/- 0.2	1.8 +/- 0.2	4.5 +/- 0.4

Notes:

- When selecting the chewing gum pieces it is important to select those pieces which do not appear to have surface cracks which are potential weak regions and would hence produce highly variable results. This is also true of sections where the width is variable. In order to make comparisons between tests it is important that the sample width is a constant value.
- 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.