Production: PRETZEL STICKS

Objective: Measurement of the hardness and fracturability of pretzel sticks

Type of action: Bending test

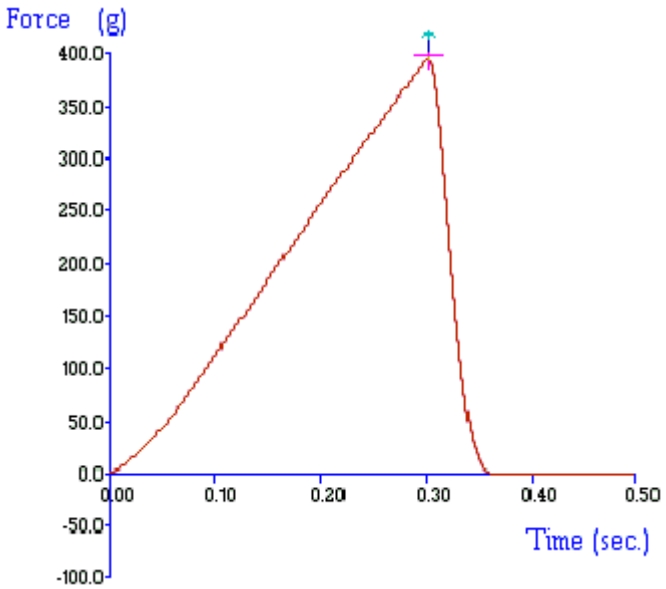
Test mode settings:

Speed	Test mode	Trigger	Target	Hold
1 mm/s	Distance (c)	5 gf	3 mm	0 sec

Accessory:
Three-point bending rig, Platform

Test Set-Up:
The two adjustable supports of the rig base plate are placed a suitable distance apart so as to support the sample e.g. 30mm. For comparison purposes this gap distance should be noted and kept constant. The base plate is then secured onto the Heavy Duty Platform. The Heavy Duty Platform is moved and locked in a position that enables the upper blade to be equidistant from the two lower supports. The sample is removed from its place of storage and is placed centrally over the supports just prior to testing.

Typical plots:



The above curve was produced from a pretzel stick (12mm x 3mm) tested immediately after removal from its packet.

Observations:
Once the trigger force is attained the force is seen to increase until such time as the pretzel stick fractures and falls into two pieces. This is observed as the maximum force and can be referred to as the 'hardness' of the sample. The distance at the point of break is the resistance of the sample to bend and so relates to the 'fracturability' of the sample i.e. a sample that breaks at a very short distance has a high fracturability.

Data Analysis:

☒Max Force

Results

Sample	Mean Max. Force 'Hardness' (+/- S.D.) (g)	Mean Distance at Break 'Fracturability' (+/- S.D.) (mm)
A	458.3 +/- 52.6	0.38 +/- 0.05

Notes:

- When comparing samples ensure that the diameters of the samples and the distance between the support blades are identical. A sample of larger diameter (and hence larger contact area) will require more force to fracture. Similarly a larger force would be required to fracture the samples if the lower support blades were moved closer together.
- Storage, packaging and handling of the sample before testing are considered variable conditions under which the biscuits are tested. These conditions should be identified and kept constant 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.