Production: CEREAL BARS

Objective: Comparison of hardness of 'crunchy' vs. 'chewy' cereal bars by shearing

Type of action: Cutting test

Test setting:

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

Accessory:

Kramer shear cell - 5 blades, Platform

Sample Preparation:
Remove samples from their packets just prior to testing. Cut each sample is cut to a length that enables it to fit into the sample cell with clearance e.g. 7cm. Place centrally in the cell, making sure that the samples sit flattened on the cell base. After testing remove the sample from the cell and scrape of any residue from the blade ends to avoid false triggering on the next sample.

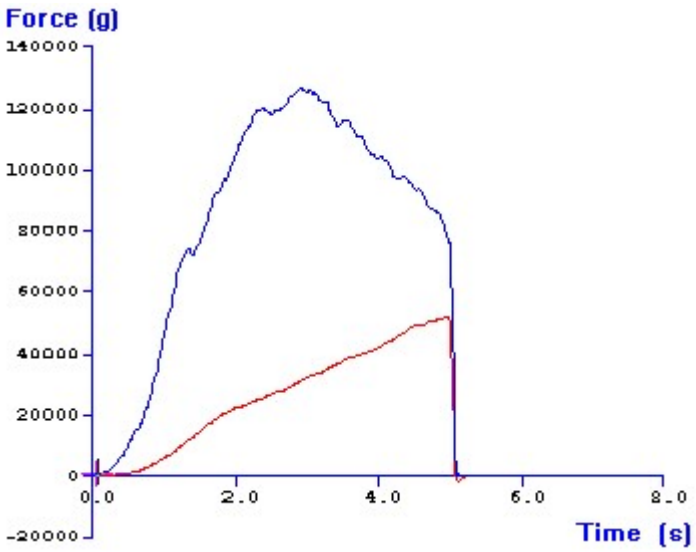
Test Set-Up:
The empty Shear Cell (perspex front forward) is secured in the Heavy Duty Platform, which is loosely fixed onto the machine base. The blades are attached to the load cell carrier by means of the rapid locating adapter and lowered slowly into the sample cell and through the base slots. The Heavy Duty Platform is then manoeuvred until clearance is visible between the blades and their respective slots. The blades are then raised above the cell to allow for placement of the test sample.

Before carrying out the test using a 'Button' trigger one must calibrate the blades to acknowledge the bottom of the cell as a zero position. To do this, lower the blades, so that they are close to the bottom of the cell. Specify the distance that you want the blades to start from for each test - e.g. 12mm is suggested. (Note: place a piece of thin flat card in the bottom of the cell to calibrate and then remove this before testing.)

The blades will move down and touch the card and then move up to the specified start distance. For the comparison of results it is crucial that the test always begins at the same distance from the bottom of the cell, this distance can be programmed into the CONTROL PROBE feature.

Prior to each test ensure that there is good clearance around the blades to avoid frictional effects, i.e. so that the blades are not touching the sides of the cell. Running a 'blank' test i.e. a test without any sample in the cell can check this. The blades are then raised above the cell to allow for placement of the test sample. Running a spatula (or other) horizontally across the outside edges of the blades is recommended to ensure that the blades are hanging freely. Place the sample into the cell and run the test. In between tests clean the blades and the grooves of the cell to remove any remaining sample, as this will cause variable results.

Typical plots:



The above curves were produced from 2 different types of oat cereal bars (chewy and crunchy), tested at 20C.

Observations:
After the trigger force (25g) is attained on the sample surface the blades then proceed to shear through the samples. As penetration depth increases the force is also seen to increase up to the specified compression distance (i.e. 10mm). At this point the maximum force value is observed and considered to be an indication of hardness. The results show that the crunchy cereal bar is harder than the chewy cereal bar, as it required more force to shear through it.

Data Analysis:

☒Max Force

Results

Sample	Mean Maximum Force 'Hardness' (+/- S.D.) (kg)
Chewy	36.5 +/- 3.4
Crunchy	137.7 +/- 14.5

Notes:

- The Noise emitted during this test can be measured and analysed using an Acoustic Envelope Detector.
- The area under the curve can also be calculated by adding the command into the macro. It is the work of shear and is an indication of the 'toughness' of the sample.
- 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.