Production: MUFFIN

Objective: Measurement of the firmness and springiness of muffins

Type of action: Relaxation test

Test setting:

Speed	Test mode	Trigger	Target	Hold
1 mm/s	Distance (c)	5 gf	8 mm	30 sec

Accessory:

ϕ36 mm cylinder probe, Platform

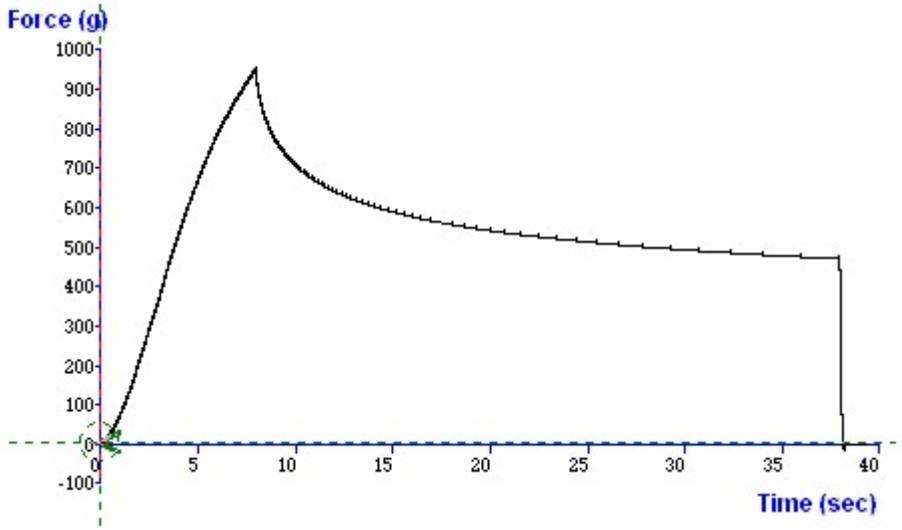
Sample Preparation:

Remove samples from place of storage just prior to testing to retain moisture & freshness. Slice-off the bottom & top crusts plus a marginal amount off the sides to form a cube-like shape (this is so that the softer inside of the muffin is tested only & not the outer harder crust).

Test Set-Up:

Place the sample centrally under the cylinder probe, avoiding any irregular or non-representative areas. This test assumes that the surface of the sample is larger than the diameter of the probe being used.

Typical plots:



The above curve was produced from a sample of muffin tested at room temperature.

Observations:
The above plot illustrates a Force-Time curve which shows the characteristics of a muffin firmness and springiness test. The probe compresses the sample until it has compressed 25% of the product height. It holds at this distance for 30 seconds and then withdraws from the sample and returns to its starting position.

Firmness is defined as the force (in grams, kilograms or Newtons) required to compress the product by a pre set distance e.g. 25%. A simple way of looking at the springiness property is to record the force after 30 seconds and divide this by the maximum force and then multiply by 100%, i.e.

$F_{30sec} / F_{max} \times 100 = \%$ recovery

The closer the resulting value is to 100% the more like a 'spring' the product is.

Data Analysis:

☒Max Force

☒Force after hold

☒Springiness Ratio

Results

Sample	Mean Compressive Force 'Firmness' (g) (+/- S.D.)	Springiness (%) (+/- S.D.)
A	941.4 +/- 72.6	49.7 +/- 0.3

Notes:

- Before commencing each test, consideration should be taken to ensure each muffin sample is of the same height otherwise when the Texture Analyser compresses by 25% of the sample height the distance travelled by the probe will vary. A level surface is also important for correct triggering.
- Here the muffin tested was a plain variety, i.e. lemon flavoured with poppy seeds. A type containing particles such as chocolate chip or fruit pieces could give rise to inconsistent results/fluctuating curve.
- 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.