

Production: MAYONNAISE

Objective: Comparison of penetration forces and consistency of full-fat and low-fat mayonnaise using a cylinder probe

Type of action: Penetration test

Test mode settings:

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

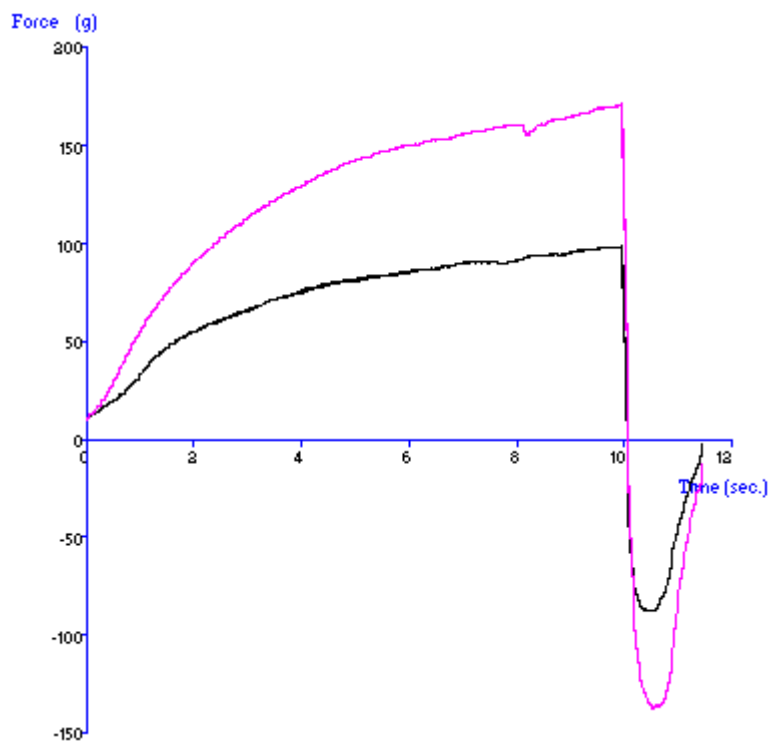
Accessory:

φ25 mm cylinder probe, Platform

Test Set-Up:

Remove the sample containers from place of storage just prior to testing. Position a sample container centrally under the probe and commence the penetration test.

Typical plots:



The above curves were produced from 200g of full-fat and low-fat mayonnaise, tested at 7C.

Observations:

Once the trigger force of 10g is attained the probe proceeds to penetrate 10mm into the sample. At this point it returns to its original start position. The force is seen to gradually increase as penetration depth increases in each case. The low-fat mayonnaise however appears to require a considerably higher force to penetrate to the specified depth compared to its full-fat counterpart highlighting the difference in emulsion phase compositions. The negative profile of the plot is as a result of sample adhesion to the probe on return or resistance of the probe to removal from the product due to the consistency of the sample.

Data Analysis:

☒ Max Force

Results

Sample	Mean Max. Force 'Firmness' (+/- S.D.) (g)	Mean Total Force Area 'Work of Penetration' (C.V.) (%)
Low-Fat	126.0 +/- 8.8	7.2
Full-Fat	84.1 +/- 2.4	1.8

Notes:

- Depending upon the regularity of the surface (i.e. the pot contents may not have settled as a flat surface), it may be necessary to increase the trigger force value slightly. Consider that when the test begins to plot data the cylinder probe should be in such a position so as to be in full contact with the product surface but should not have not started penetrating to any considerable depth.
- The product may be tested directly from the container in which it was originally dispensed. However, when comparing different samples try to ensure that the container size and the volume of product dispensed are the same.
- During penetration a large blip in the otherwise smooth curve may be observed. This is due to the compression of a bubble within the product close to the probe.
- A back extrusion test (e.g. using 35mm disc) is an alternative test to distinguish between such samples shown here. Whilst the resulting curve shapes will be different, the same conclusions will be obtained.
- 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.