

APPLICATION

Simple QC test required for the assessment of marmalade consistency.

TEST OBJECTIVE

To evaluate the gel structure and consistency of marmalade and French raspberry jam.

BACKGROUND

The products supplied were totally free flowing at ambient temperature. Each contained particulate fruit pieces however these pieces were very small and not considered to affect results. Back extrusion using jar the product was supplied in and a 38 mm diameter cylinder probe with shallow gradient to base was used. Probe travels to sample surface and instrument is triggered at set load. Probe then travels into sample where load rapidly increases initially followed by plateau of loads as critical yield stress is reached and product begins flow.

METHOD

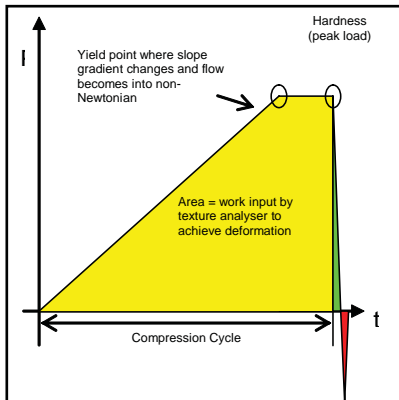
Jam sample was simply located centrally beneath test probe at ambient temperature of 22°C. The test probe was driven into the sample following conditions given and the samples response evaluated.



TABLE 1
QTS / LFRA Settings

MODE:	Compression
TOTAL CYCLES:	1
TRIGGER:	5g
TEST SPEED:	1 mm s ⁻¹
RETURN SPEED:	As Test
TARGET UNIT:	Distance
DISPLAY UNITS:	g
TARGET VALUE:	30 mm
DISPLAY VALUE:	Peak
WEIGH CELL:	4.5 kg

GRAPHICAL INTERPRETATION:



PARAMETERS OF INTEREST:

- HARDNESS:** Peak load recorded during the first compression cycle e.g. the force necessary to attain a given deformation.
- AREA CYCLE 1:** Work (J) required to attain target deformation. Indicative of the internal strength of bonds within product e.g. strength of gel network.
- ADHESIVE FORCE:** Force required to "pull" the probe from the sample surface e.g. "stickiness".
- ADHESIVENESS:** Work (J) required to break contact between sample and probe.

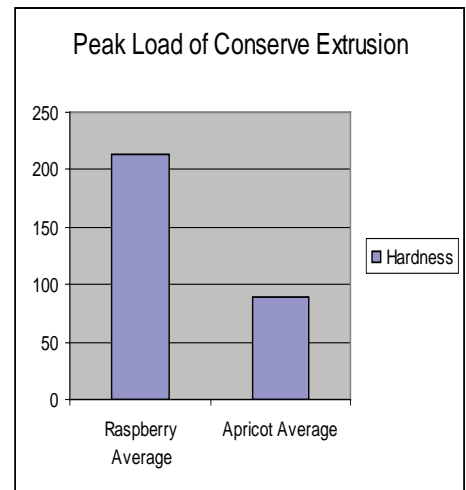
RESULTS

SELECTED CALCULATIONS

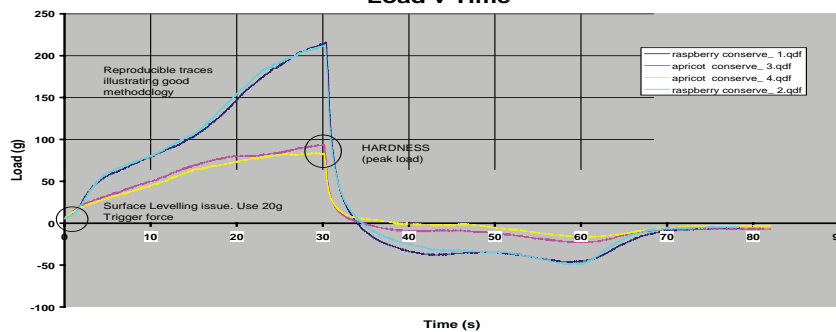
	Raspberry conserve_1.qdf	Raspberry conserve_2.qdf	Ave.
Hardness (g)	216	212	214
Adhesive force (g)	-47	-50	-48.5
Adhesiveness (gs)	-1216.2	-1085.625	-1150.91
Area cycle 1 (gs)	3713.6626	3788.0625	3750.863

SELECTED CALCULATIONS

	Apricot conserve_3.qdf	Apricot conserve_4.qdf	Ave
Hardness (g)	94	84	89
Adhesive force (g)	-23	-17	-20
Adhesiveness (gs)	-539.325	-299.77499	-419.55
Area cycle 1 (gs)	1939.725	1808.92505	1874.325



BACK EXTRUSION OF CONSERVES



DISCUSSION

A clear difference between the two jam samples can be observed through all of the core parameters selected. The test provides an objective means to quantify the subjective puree type consistency. The differences are primarily reflected by the differences in energy input to reach the 30 mm penetration whilst the Hardness value directly relates to the Gel strength of the product. The adhesiveness parameters provide an indication of how the sample adheres to the test probe. Primarily this is related to the gel strength where the harder gels create a void as the sample is displaced during the compression cycle. During retraction of the probe this essentially creates a vacuum between the probe/ sample interface and thus must be considered as an indicator of sample adhesion.