BROOKFIELD

APPLICATION

Simple penetration test of pears.

TEST OBJECTIVE

To quantify the difference between ripe and unripe pears through implementation of simple penetration principles.

BACKGROUND

Pressure tests have traditionally been applied in the quantification of textural properties of pears. Correlation of instrumental mechanical measures with perceived sensory characteristics provides an objective method of quantifying subjective parameters. Quantification of textural properties is beneficial in:

1. Determining optimum point of harvest
2. Controlled ripening and storage
3. Optimization of process operations (e.g., freezing, blanching, cooking, etc.)
4. Indicator of potential mechanical injury (bruising)
5. Control of raw materials through application of objective quality measures
6. Conformance to customer requirements and supply of correctly ripened products
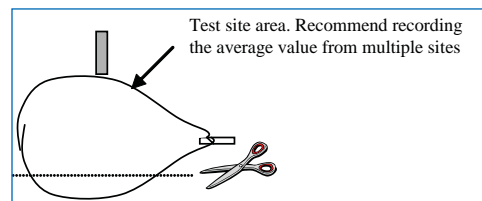7. Quantification of product shelf-life in relation to ripening.

METHOD

Samples were taken from modified atmosphere packaging on day of purchase at ambient conditions. A small section of each fruit was removed (as in illustration) to give stable test surface through which to penetrate.
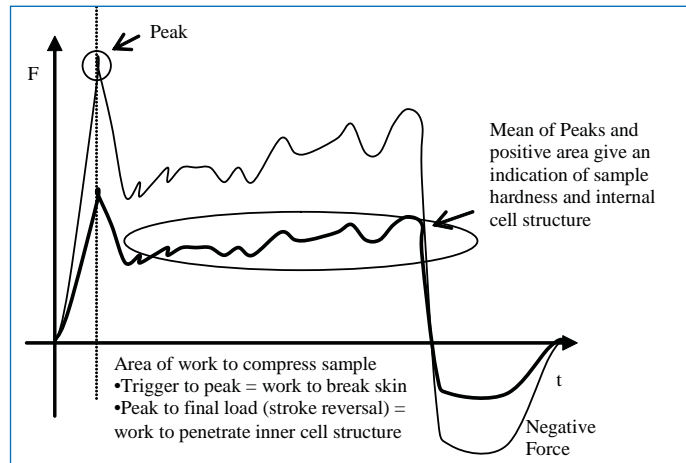

TABLE 1
LFRA Settings

MODE:	Measure force in compression
PLOT:	Peak
SPEED:	0.5mm/s
DISTANCE:	10
OPTION:	Normal
TRIGGER:	Auto 4g Trigger

PROBE REF:	2mm Ø stainless steel probe, TA 39

Test site area. Recommend recording the average value from multiple sites

SETTING THE STANDARDS *in Texture Testing*

READING

PARAMETERS

HARDNESS	Peak positive value within first compression cycle. Direct indication of skin strength. Skin yields and ruptures prior to inner flesh penetration.
SKIN MODULUS	Curve slope or gradient during penetration. Indicative of flesh rigidity and cell turgidity.
WORK TO RUPTURE SKIN	Area of graph.
MEAN OF INTERNAL PEAKS	Mean of positive peaks after skin rupture; indicative of internal cell structure.
TOTAL POSITIVE AREA	Work to complete penetration cycle, including that to initially rupture skin (e.g., sample consistency).
ADHESIVENESS	Total negative area, indicative of work required to pull the probe from the sample.
ADHESIVE FORCE	Peak negative force caused by "pinching" and suction of fleshy sample.

RESULTS

	RIPE	UNRIPE
HARDNESS (SKIN) (g)	306	1045
SKIN MODULUS (g/s)	257.1	641.3
WORK TO RUPTURE SKIN (gs)	186.2	866.2
MEAN OF INTERNAL PEAKS (g)	220.8	573.2
TOTAL POSITIVE AREA (gs)	3748.6	11072.2
ADHESIVENESS (gs)	-121.8	-386.1
ADHESIVE FORCE (g)	-87	-327

DISCUSSION

The unripe pear is much harder than the ripe pear; it exhibits greater resistance to penetration by the 2mm Ø probe. The inner flesh of the ripe pear is much softer than the unripe pear, as shown by the mean of selected peaks, after rupture or yield of the skin.\

CONCLUSION

This simple test clearly shows differences in pear ripeness.