

**Production:** TORTILLAS

**Objective:** Comparison of uniaxial extensibility of two brands of wheat flour tortillas

**Type of action:** Tension

**Test setting:**

Speed	Test mode	Trigger	Target	Hold
1 mm/s	Distance (c)	5 gf	15 mm	0 sec

**Accessory:**

Double c-clamp fixture

**Sample Preparation:**

Cut the tortillas into strips of a constant specific length and width. It is important that the samples are representative of the whole tortilla. This can be done by holding the tortilla up to the light and choosing a uniform area.

**Test Set-Up:**

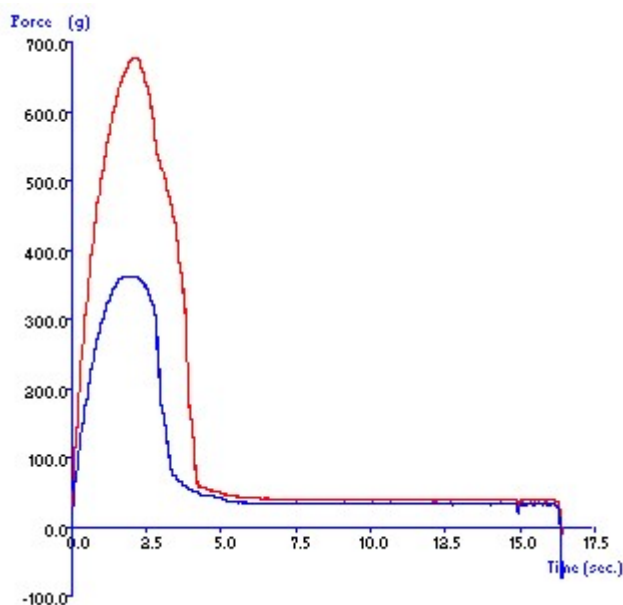
Attach the upper tensile grip to the load cell carrier and secure the lower tensile grip to the base of the machine. Calibrate the tensile grips to start from a set distance apart for each test e.g. 20mm (see probe calibration below) and save this as a preset position using the Probe Preset icon in the Project window. For example insert Distance 20mm and Speed 10mm/sec.

Move the upper grip to a higher sample loading position so that when the sample is attached to the upper grip it is free to hang without contact with the lower grip, insert a tortilla strip and tighten the grip to secure the sample. Click on T.A. - Move Probe and then Tools - Tare (to zero the weight of the upper grip and sample). Move to the Preset start position by clicking Memory - Location 1 and click on the required position. Attach the sample to the lower grip. When doing this one must try to minimise the slack in the sample between the jaws without stretching the sample.

Note: To protect the sample from the jaw faces of the grips, position pieces of card, e.g. 35x25mm on each side of the sample at both ends to protect it.

**Probe Calibration:**

Lower the grips, so that they are close together. Click on T.A. (in the menu bar) then CALIBRATE PROBE and specify the distance that you want the grips to start apart from each other for each test - e.g. 20mm is suggested.

**Typical plots:**

The above curves were produced from two different brands of flour tortilla strips (70 x 35mm).

**Observations:**

Once the OK button is clicked the test begins and the graph proceeds to plot the effect on the tortilla under tension. When the elastic limit is exceeded the tortilla snaps (observed as the maximum tension force). The greater the distance at the break point the more extensible the sample. It is quite clear that Type A is considerably more extensible and requires greater force to stretch (and is therefore tougher) than Type B.

**Data Analysis:**

- ☒ Max Force  
☒ Peak Distance

**Results**

Sample	Mean Max. Force 'Resistance to Extension' (+/- S.D.) (g)	Mean Distance at Break 'Extensibility' (+/- S.D.) (mm)
A	671.6 +/- 54.2	2.6 +/- 0.3
B	381.6 +/- 41.0	2.1 +/- 0.3

**Notes:**

- Before commencing each test, consideration should be taken to ensure that there are no apparent weaknesses along the exposed sample length which would hence result in lower break forces and distance of break values. This can be achieved by holding the tortilla up to a light source and selecting a uniform area avoiding under-baked or over-baked areas.
- When analysing the results the variation in break distance values may be found to be quite high. This is due to the inherent non-homogeneous texture of tortillas.
- 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.