

Production: COOKED SPAGHETTI

Objective: Determination of pasta firmness using the AACC (16-50) Standard method

Type of action: Cutting test

Test mode settings:

Speed	Test mode	Trigger	Target	Hold
1.7 mm/s	Distance (c)	0 gf	4.5 mm	0 sec

Accessory:

Blade of acrylic, Platform

Sample Preparation:

Cook the spaghetti in a carefully controlled way. For comparison purposes the mass of dry pasta, volume of water, cooking time and the time period between cooking and testing must be kept constant.

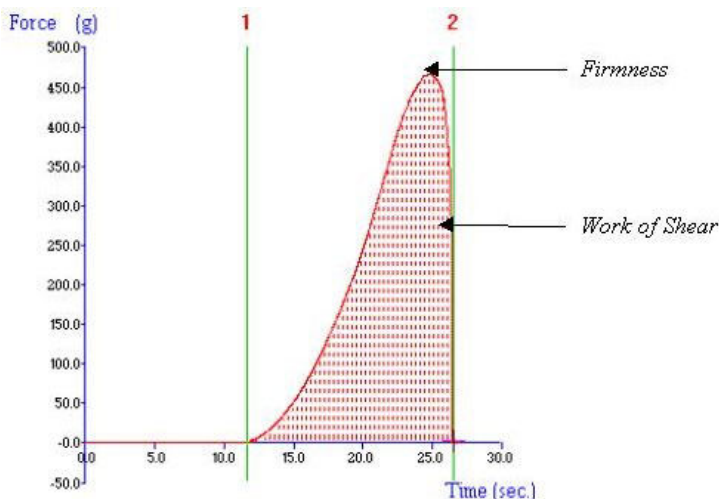
Probe Calibration:

Before carrying out the test with a 'Button' trigger one must calibrate the probe to acknowledge the texture analyzer test surface. To do this, lower the probe, so that it is close to the test surface. Click on **CALIBRATE HEIGHT** and specify the distance that you want the probe to return to, after sample compression, for each test - e.g. **5mm** is suggested.

Test Set-Up:

Place five strands of spaghetti (or approximate equivalent width of other forms) adjacent to one another centrally under the knife blade, with the axis of the product at right angles to the blade. Commence the test and repeat using fresh samples.

Typical plots:



The above curve was produced from testing 5 strands of cooked 100% Durum wheat spaghetti

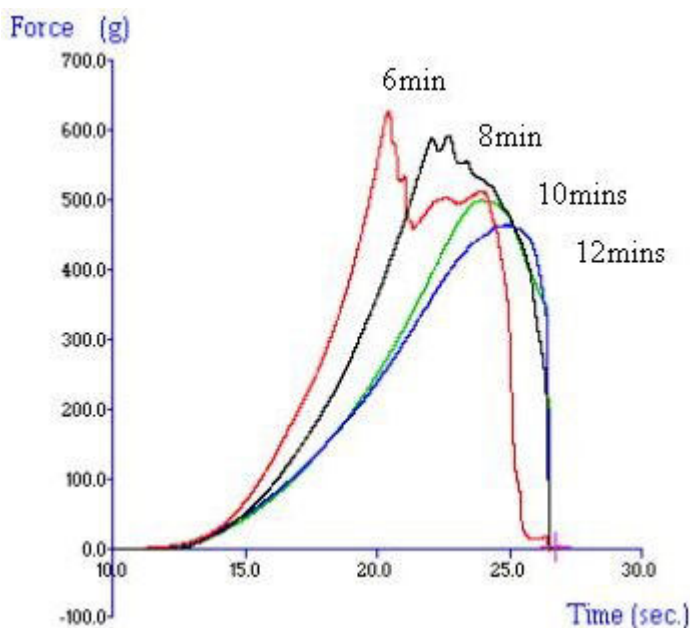
Observations:

The above plot illustrates a force-time (or distance) curve which shows the characteristics of a spaghetti firmness test. The blade shears the sample until it reaches 0.5mm from the texture analyzer test surface. It then withdraws from the sample and returns to its starting position.

Firmness is defined in this method as the work in grams-centimeter required to shear one piece of pasta (e.g. one strand of spaghetti) (AACC, 1983). Units displayed can be converted automatically according to standards or other requirements.

Walsh (1971) also used the maximum cutting force per unit area as a measure of spaghetti firmness but the results of both of these tests have been found to correlate well with data obtained by subjective cooking tests.

An example of the use of this type of test is in the determination of cooking tolerances of pasta samples according to the raw materials and processing methods utilised (see below).



Force-time curves obtained from the measurement of 100% durum wheat spaghetti samples (cooked for times 6,8,10 and 12 mins) using AACC method 16-50.

Data Analysis:

☒ Max Force

Results

Cook Time (mins)	Mean Max. Force 'Firmness' (+/- S.D.) (g)	Mean Area 'Work of Shear' (+/- S.D.) (g·cm)
6	210.0 +/- 14.5	23.8 +/- 1.7
8	194.5 +/- 11.9	30.8 +/- 1.5
10	167.5 +/- 4.7	25.6 +/- 0.4
12	155.2 +/- 4.2	24.5 +/- 0.3

Notes:

- This AACC method (16-50) for the measurement of pasta cooking quality, with respect to firmness, was first approved in 1989 and is now widely used. Like most instrumental tests used to evaluate pasta quality, this method involves destructive measurements on the samples tested. (Edwards *et al.*, 1993). It recommends the use of a knife blade, machined to a 1mm flat across the cutting edge, which measures the force required to cut five strands of spaghetti (or approximately equivalent width of other pasta forms) positioned adjacent to one another.
- This Standard method is applicable to spaghetti, noodles, and other pasta shapes having uniform, solid cross section (AACC, 1983).
- Single blade tests may not work well for short goods, therefore a multiple shear test using many cutting blades, e.g. a Kramer shear cell, may be more applicable.
- 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.

References:

AMERICAN ASSOCIATION OF CEREAL CHEMISTS (1983). Approved Methods of the AACC. Method 16-50. Approved November 1989. The Association: St. Paul, MN.

EDWARDS, N. M., IZYDORCZYK, M. S., DEXTER, J. E. & BILIADERIS, C. G. (1993). Cooked pasta texture: Comparison of dynamic viscoelastic properties to instrumental assessment of firmness. *Cereal Chemistry*, 70 (2), 122-126.

WALSH, D. E. (1971). Measuring spaghetti firmness. *Cereal Science Today*, 16, 202.