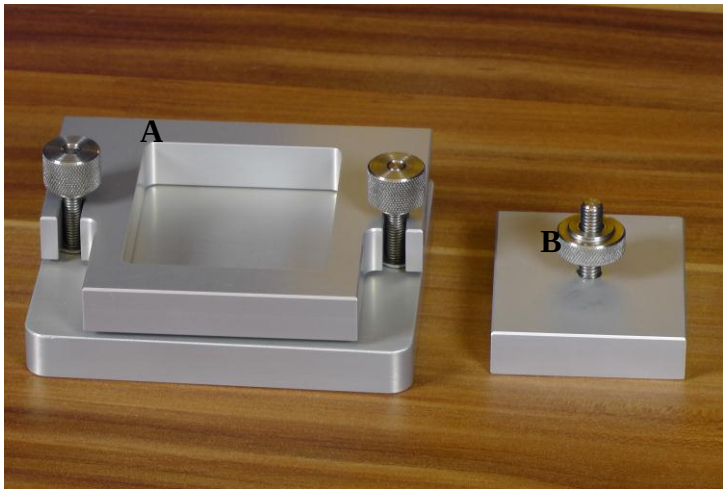
Product: COOKED PASTA

Objective: Evaluating pasta stickiness

Background:
The pasta firmness and stickiness fixture is used to measure the firmness and stickiness of cooked pasta. Strands or a sheet of pasta is held into position on the retaining plate using the supporting block that pins down the sample exposing a rectangular section of the pasta. The rectangular compression platen is attached to the probe shaft of the instrument and is used to determine the firmness of the pasta when applying a compressive force and the stickiness of the pasta as the probe withdraws from the pasta**.**



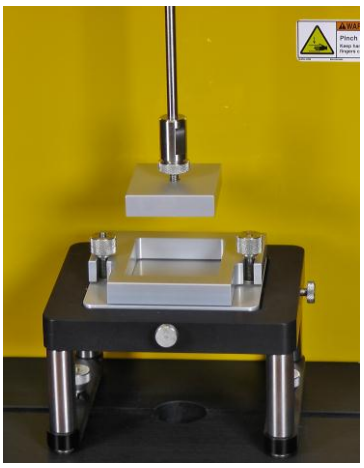
A Supporting block and Retaining Plate

B Rectangular Compression Platen

Accessories:
4.5 Kg Instrument
Pasta Firmness and Stickiness Fixture (TA-PFS)
Fixture Base Table (TA-BT-KIT)

CT3 Settings:

Test Type:	*Compression*
Pre-Test Speed:	*1.0 mm/s*
Test Speed:	*0.5 mm/s*
Post-Test Speed:	*0.5 mm/s*
Target Force:	*1000.0 g*
Hold Time:	*5 sec*
Trigger Force:	*20.0 g*



METHOD

Sample Preparation:

1. Place 30 g portion of the sample into a container of 300ml boiling water.

2. Start the stop watch

3. Stir the pieces of pasta whilst cooking to avoid the pasta clamping together. Partly cover the container to avoid too much water evaporation. The cooking water should be maintained to at least 90 % of its volume.

4. To monitor the cooking process, remove a piece of pasta each time from the container at 30 seconds intervals and squeeze the pieces between two clear plastics each time until the white centre of the pasta just disappears an indication that the pasta is cooked.

5. Stop the stop watch at this point. The time now showing on the watch is the cooking time that will be applied to all test samples using this method

6. Immediately drain the cooked pasta in a funnel and rinse with a stream of water for 30 seconds

7. Transfer the cooked pasta into a beaker of water prior to testing. Testing should take place immediately after cooking to avoid textural changes as a result of storing the pasta in a liquid medium

Test Procedure:

1. Attach the rectangular compression probe to the probe shaft of the instrument

2. Place the fixture base table onto the base of the instrument and loosely tighten the thumb screws to enable some degree of mobility

3. Insert the pasta stickiness fixture to the fixture base table and tighten into position using the side screws

4. Unscrew the supporting block so that the sample can be placed vertically on the retaining plate.

5. Place the cooked sample as flat as possible on the retaining plate. The sample should exceed the length of the retaining plate.

6. Place the supporting block over the sample and pin the sample down using the screws on the supporting block. This will prevent the sample from being lifted up on probe withdrawal. The sample must also be firmly anchored to the plate to avoid errors in measurement. However, care must be taken when clamping the sample. Avoid clamping the sample too tightly otherwise the retaining plate might cut through it.

7. Lower the arm of the instrument such that the rectangular compression platen is a few centimetres from the sample surface

8. Centrally align the rectangular portion of the sample under the compression platen by re-positioning the base table

9. Once alignment is complete, tighten the thumbscrews of the fixture base table to prevent any further movement
10. Commence the test

Note:

The hardest sample is best tested first in order to anticipate the maximum testing range required. This will ensure that the force capacity covers the range for other future samples.

The stickiness of a sample depends on the amount of unabsorbed water from: (a) the cooking and drainage stage, (b) length of time between drainage and testing, and (c) the relative humidity in the testing area. Stickiness will also be influenced by class of wheat, and protein content.

As the measurement of pasta stickiness can vary if conditions are not controlled, a number of factors need to be considered and controlled in order to make valid comparisons:

1. The testing time after cooking should remain constant. Samples tested immediately after cooling in water give very low stickiness values due to lubrication as a result of the water on the sample surface.

2. The texture of cooked pasta changes over time. As such, sample stickiness increases as the time interval between draining and measuring increases. It is therefore recommended that stickiness measurements be made after a time period. 10 minutes after draining would be recommended.

3. Ensure that the sample is well drained. Water in samples may affect stickiness values due to lubrication or cause the sample to slip.

4. The chosen compression force must not be too low as the probe may not have come into full contact with the sample at the lower applied forces and may consequently give reduced stickiness values. Conversely, too high a compression force may increase stickiness values by compressing and penetrating the sample.
   A compression force of 1000 g has been selected in this test as it enables full contact between sample surface and probe. For firmer samples, the compression force can be increased. This also applies to using a wider cylinder probe. The larger the surface area of the probe the higher the force of compression required for full probe/sample contact.
   The magnitude of the adhesive values will be influenced by the return speed. This must be kept in mind when testing different sample and when making comparisons.

RESULTS

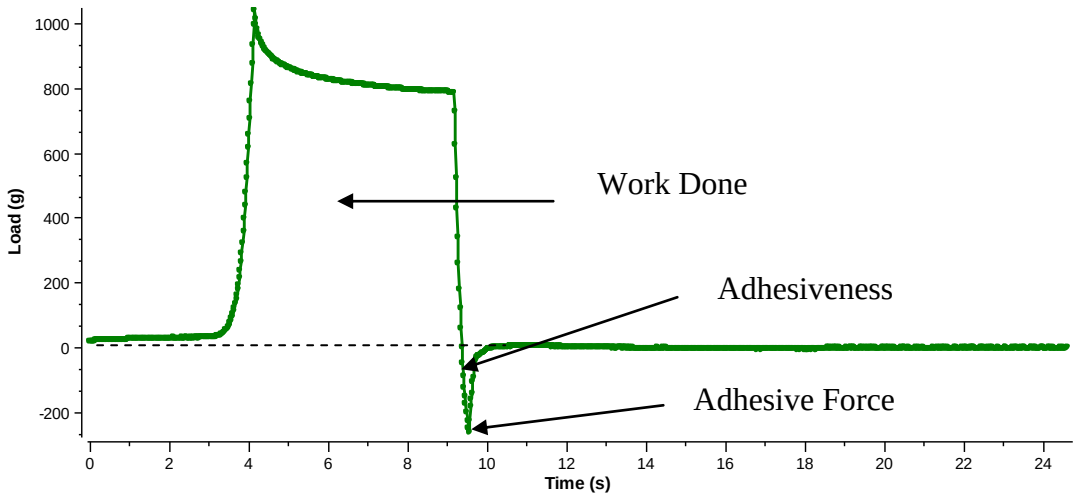


Figure 1. The stickiness of pasta using the pasta firmness and stickiness fixture. The area under the graph is a measure of work done. The maximum negative peak value is a measure of sample adhesive force. The area above the negative peak is a measure of sample adhesiveness.

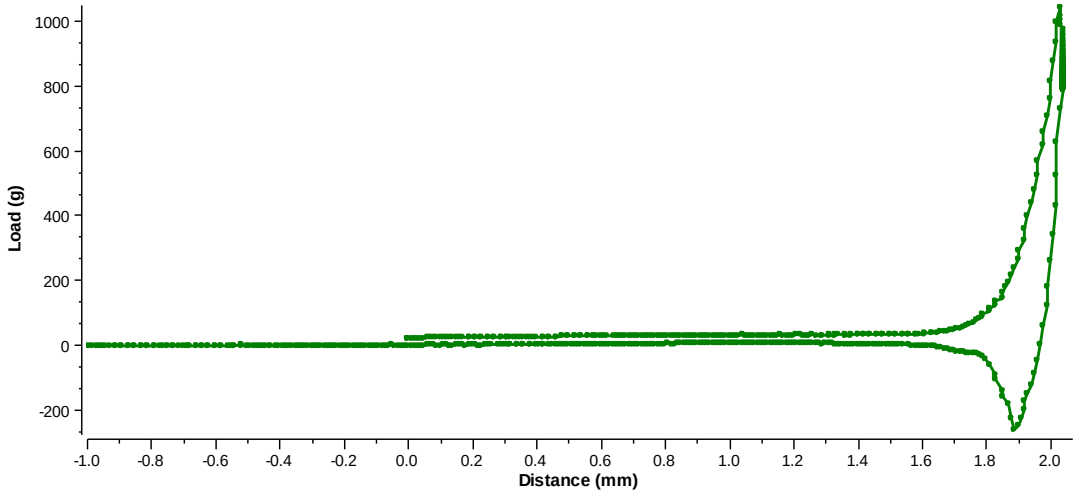


Figure 2. The stickiness of pasta using the pasta firmness and stickiness fixture. This is an alternative option for displaying the results. It shows the distance travelled to obtain the compressive force of 1000g on the sample as specified in the method. The maximum negative peak value is a measure of sample adhesive force. The area above the negative peak is a measure of sample adhesiveness.

Observations:
When a trigger force of 20 g has been attained at the sample surface, the compression probe proceeds to compress the sample at a test speed of 0.5 mm/s until a force of 1000 g has been attained. The compression probe then holds the sample under the 1000 g force over a period of 5 seconds known as the hold time before withdrawing from the sample at the test speed (0.5 mm/s). As the probe withdraws from the sample, sample stickiness is measured. This is observed on the graph as the maximum negative peak force required to overcome the attractive forces between the sample and probe; the higher the force value, the stickier the sample. The energy required to separate the sample from the probe as the probe withdraws from the sample is a measure of sample adhesiveness. The work done is measured as the area under the positive peak. This is the energy required to overcome the strength of the internal bonds within the sample. These measurements correlate to the sensory stickiness of the pasta in the mouth and teeth.

The Texture Pro CT software can automatically calculate the work done, adhesive force and adhesiveness of the samples as shown below:

Sample	Work Done (mJ)	Adhesive Force (g)	Adhesiveness (mJ)
Pasta	1.46	260.5	0.43

Technical Assistance:

At Brookfield we pride ourselves on the availability and quality of our technical support. Our Texture departments are staffed with experienced Texture Specialists with extensive practical and theoretical expertise in sample preparation, presentation and analysis. If you have any questions or experience any difficulties regarding Texture Analysis methodology or software in general, please do not hesitate to contact us.

Brookfield customers are a major source of information regarding the use of our products. We encourage you to contact us if you have any suggestions on product performance or new applications or technologies.

For technical assistance and more information, please contact:
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