

Dough Firmness Test

Firmness testing of dough is essential for assessing texture consistency, which is crucial in quality control for baked goods. By measuring hardness (peak load) and work done, manufacturers can verify the dough's cohesiveness and elasticity, ensuring that the product meets production standards.

Background:

- Dough exhibits viscoelastic properties, combining solid-like elasticity and liquid-like deformation. These properties are influenced by factors such as gluten content, water absorption, and ingredients.
- The gliadin and glutenin proteins in gluten affect the dough's extensibility and elasticity, respectively. Hardness testing evaluates these properties to determine the dough's ability to retain structure during processing.

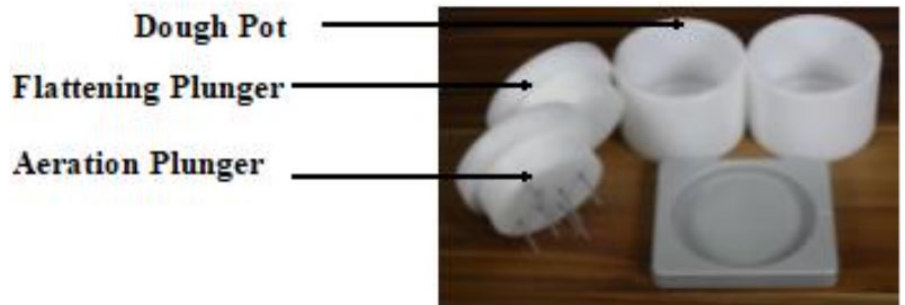


Equipment:

- CTX Texture Analyzer with 5 kg load cell
- Probe and Fixtures:
 - 6 mm Cylinder Probe (TA-41) for penetration
 - Dough Preparation Set (including aeration and flattening plungers, dough pot, and base plate)
- Software: Texture Pro for controlling parameters and recording data

Settings:

- Test Type: Compression
- Pre-Test Speed: 1.0 mm/s
- Test Speed: 1.0 mm/s
- Post-Test Speed: 1.0 mm/s
- Target Type: Deformation
- Target Distance: 15 mm
- Trigger Force: 5 g



Dough Preparation Set

Sample Preparation:

1. Prepare dough according to standard procedures.
2. Place dough in the dough pot and remove air pockets with the aeration plunger.
3. Flatten the dough surface using the flattening plunger to ensure a smooth testing surface.

Procedure:

1. Attach the 6 mm cylinder probe to the instrument.
2. Secure the fixture base table and align the dough pot under the probe.
3. Position the probe 20 mm above the dough surface and start the test.
4. Conduct up to six tests per sample, rotating the dough pot to a new position for each test.
5. Clean the probe between tests to ensure accuracy.

Observations:

- Figure 1: Load vs. Time graph displays the dough’s hardness, with the peak force representing the maximum load required to penetrate 15 mm.
- Figure 2: Load vs. Distance graph shows the work done to penetrate the dough. The area under the positive peak reflects the energy needed to overcome internal dough bonds.

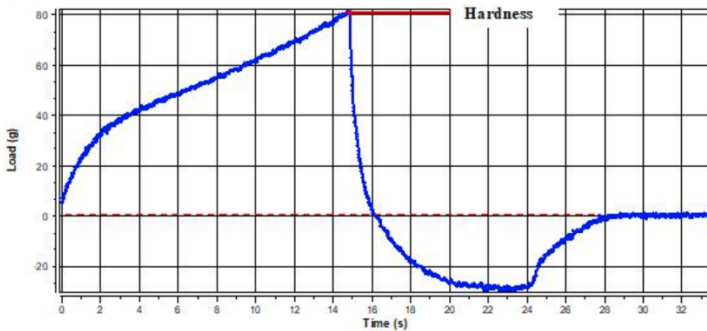


Figure 1

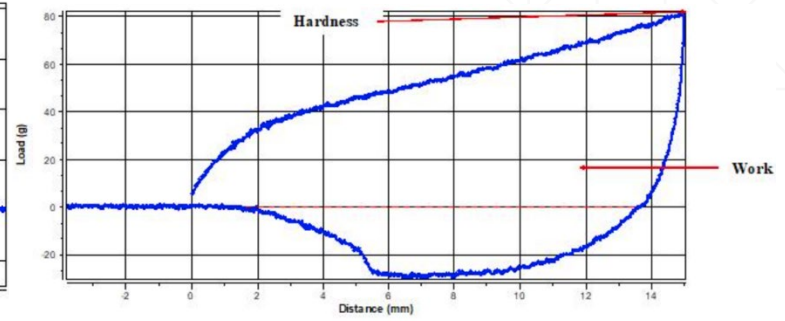


Figure 2

Results:

- Average Hardness (Peak Load): 75 ± 6 g
- Work Done: 7.3 ± 0.4 mJ

Sample	Hardness (g)	Work Done (mJ)
Dough	75 ± 6	7.3 ± 0.4

Discussion:

The hardness peak reflects the dough’s firmness, while the work done correlates with the energy needed to penetrate and deform the dough. Consistent sample preparation and testing conditions are essential to obtain reliable results, allowing manufacturers to assess dough quality effectively and adjust to meet texture standards.