

Cookie Comparison Texture Analysis

Understanding the hardness, crispiness, and fracturability of cookies is essential for ensuring product quality and consumer satisfaction. This analysis helps optimize cookie formulations and processing to achieve the desired texture characteristics.

Test Principle:

- The test compares the hardness, crispiness, and fracturability of sugar and shortbread cookies by penetrating the surface with a 2 mm cylindrical probe. The test simulates the force required for a human to bite through the cookie.

Background:

- This method measures how much force is needed to break the surface of the cookie and records the fractures caused by the probe. It provides data on cookie hardness (firmness) and fracturability (brittleness), two key texture properties for cookie quality.

Equipment:

- Instrument: CTX Texture Analyzer with a 5000g load cell
- Probe: 2 mm Flat Cylindrical Probe (TA39)
- Fixture: Fixture Base Table (TA-BT-KIT)
- Software: Texture Pro Software

Settings:

- Test Type: Compression
- Target Distance: 3 mm
- Trigger Load: 15 g
- Pre-Test Speed: 0.5 mm/s
- Test Speed: 0.5 mm/s

Procedure:

1. Set up the fixture and probe on the Texture Analyzer.
2. Place a cookie on the table and align it centrally under the probe.
3. Adjust the probe to 3 mm above the cookie surface.
4. Run the test and wipe the probe clean between samples.
5. Repeat for all cookie samples.



Observations:

- Figure I: Shows the force required to penetrate both sugar and shortbread cookies.
- Each cookie was tested four times, and the results were averaged. The shortbread cookie required more force to break down compared to the sugar cookie.
- Figure II: The Load vs. Distance graph highlights the differences in cookie texture. Shortbread cookies exhibited a higher load across the 3 mm distance, indicating greater firmness compared to sugar cookies.

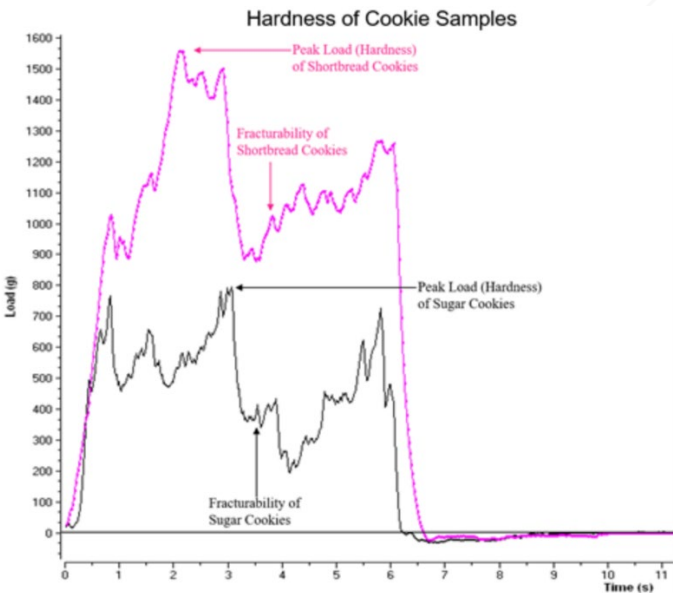


Figure I

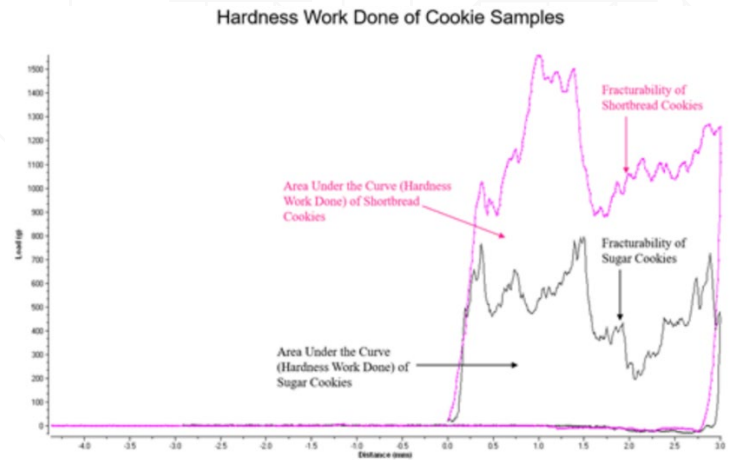


Figure II

Results:

Hardness:

- Shortbread Cookie: 1115 g, Mean Load = 291.5 g
- Sugar Cookie: 1077.5 g, Mean Load = 205.8 g

Fracturability:

- Both cookies had 23 fractures, indicating similar levels of crispiness.

Discussion:

The hardness work done is calculated as the area under the positive curve, indicating how much effort is needed to chew the cookie. Fractures, represented by jagged fluctuations in the graph, indicate crispiness and brittleness. Shortbread cookies require more work to chew and break down than sugar cookies.

Conclusion:

This analysis helps determine the ideal hardness and crispiness for various cookie types. Adhering to the test procedure and setup ensures reproducibility and accurate comparison across batches.