

# Bread Firmness Analysis

Understanding bread firmness is essential for assessing freshness and quality, key factors that influence consumer preference. Firmness, an indicator of staleness, helps manufacturers optimize formulations and production processes to maintain product quality.

## Test Objective:

- Measure the firmness of bakery products to determine their freshness and quality.

## Test Principle:

- Quantitatively measure the force required to compress a bread sample using a standard method developed by the American Association of Cereal Chemists (AACC). The force simulates a consumer's squeeze to assess loaf quality in supermarkets.

## Equipment:

- Instrument: CTX Texture Analyzer
- Probe: 38.1 mm cylindrical probe (TA4/1000)
- Software: Texture Pro

## Settings:

- Test Speed: 2 mm/s
- Distance: 10 mm
- Trigger Force: 5 g

## Sample:

- One bread slice (25 mm thick) or two slices (12.5 mm thick each) are tested, avoiding the crust and non-representative crumb areas.

## Procedure:

1. Place the bread slice on the test platform.
2. Align the probe with the center of the bread.
3. Compress the bread to 40% deformation and record the compression load at 25% deformation.



**Empirical Factors Influencing Results:**

- Sample size and age
- Formulation and composition
- Baking process and storage conditions

**Results:**

- Figure I: CTX Texture Analyzer results show firmness over three days of aging:
- Day 1: 1.956 N
- Day 2: 3.805 N
- Day 3: 4.884 N

**Discussion:**

- Bread structure is a solid foam colloid supported by a gluten network containing carbon dioxide pockets. The staling process increases firmness as the gluten matrix strengthens, resulting in a harder texture.

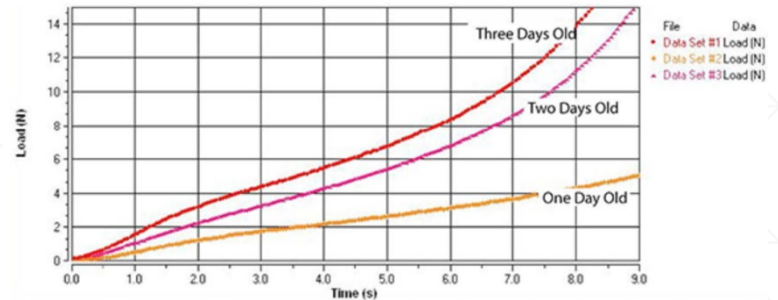


Figure I

**Conclusion:**

The compression test effectively quantifies bread firmness, offering valuable insights into staling and product quality. This method is ideal for production and development environments to monitor freshness and optimize formulations for additives and flour quality.