

Lentils Hardness Analysis

Hardness testing of cooked lentils is essential for quality control, as it provides insights into texture and cooking consistency. Measuring the force required to compress lentils cooked for varying times ensures product quality, firmness, and consumer satisfaction.

Background:

- Bulk compression tests evaluate the force needed to fracture lentils, with peak force indicating hardness. The area under the force vs. deformation curve represents the work done to compress the sample, showing the energy required for breakdown.

Equipment and Settings:

- CTX Texture Analyzer with 50 kg load cell
- Components: Compression Plunger, Ottawa Cell, Fixture Base Table, Catchment Drawer, and Texture Pro software
- Test Parameters:
 - Test Type: Compression
 - Pre-Test Speed: 2.0 mm/s
 - Test Speed: 2.0 mm/s
 - Target Distance: 10 mm
 - Trigger Force: 50 g



Sample Preparation:

1. Remove lentils from storage bags just before testing.
2. Weigh 30 g of lentils and fill approximately 50% of the Ottawa cell.

Procedure:

1. Attach the plunger to the load cell and secure the fixture base table.
2. Insert the empty Ottawa cell and align the plunger to avoid contact with the cell edges.
3. Place the catchment drawer beneath the cell, then position and secure the filled Ottawa cell on the table.
4. Lower the plunger close to the sample surface, then initiate the test.
5. Clean the plunger, extrusion plate, and cell between tests.

Observations:

- Figure I: Force vs. Time graph shows peak force for lentils cooked for 5 minutes versus 7-10 minutes, with firmer texture observed in the 5-minute sample.

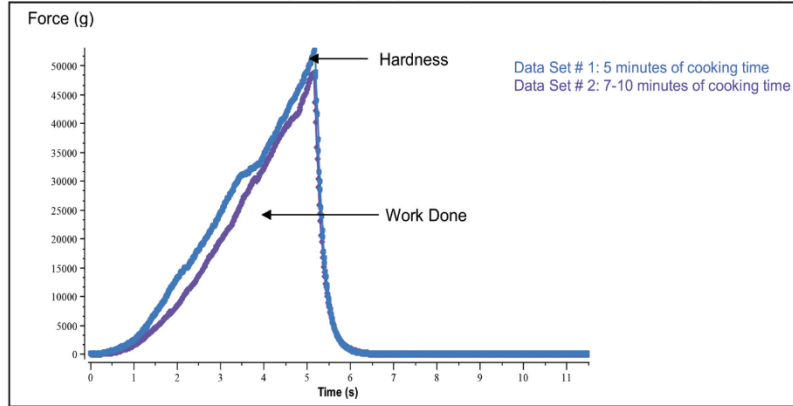


Figure I

- Figure II: Force vs. Distance graph illustrates the increase in load as the plunger compresses lentils to the target distance, with higher force for the 5-minute sample.

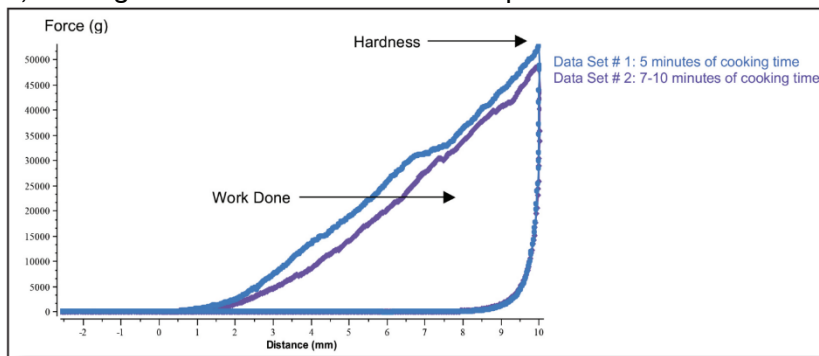


Figure II

Results:

- Hardness and Work Done:
 - 5-Minute Cooked Lentils: Hardness = 52545 g, Work Done = 2014.7 mJ
 - 7-10 Minute Cooked Lentils: Hardness = 48635 g, Work Done = 1740.2 mJ

| Lentils | Hardness (g) | Work Done (mJ) |
|---------|--------------|----------------|
| H28240A | 52545 | 2014.7 |
| H28840A | 48635 | 1740.2 |

Discussion:

The peak force measures lentil hardness, with higher values indicating firmer texture in the 5-minute sample. The work done represents the energy required to compress the sample, showing that firmer lentils need more energy to deform. This testing helps monitor texture for quality control, ensuring consistency in cooking and processing.