

Canned Tuna Texture Analysis

Firmness testing of canned tuna is essential for quality control, providing data on texture consistency across brands. By measuring the hardness (peak load) and hardness work done, manufacturers can assess product quality and ensure uniform texture for consumer satisfaction.

Background:

- Canned tuna undergoes heat processing to extend shelf life and ensure safety. This process affects texture, and measuring firmness provides insights into the product's quality.
- Tuna samples were stored at 21°C overnight before testing to standardize conditions.

Equipment:

- CTX Texture Analyzer with 5 kg load cell
- Probe: 25.4 mm diameter spherical probe (TA43)
- Fixture: Fixture Base Table (TA-BT-KIT) to secure the sample
- Software: Texture Pro for controlling parameters and recording data



Figure 1
 CTX Texture Analyzer with 25.4 mm dia. Spherical Probe (TA43)

Settings:

- Test Type: Compression
- Speeds:
 - Pre-Test Speed: 1 mm/s
 - Test Speed: 1 mm/s
 - Post-Test Speed: 5 mm/s
- Target Type: Distance
- Target Distance: 4 mm
- Trigger Load: 20 g



Figure 2
 25.4 mm dia. Spherical Probe (TA43)



Figure 3
 Samples of canned Tuna for testing

Sample Preparation:

1. Open canned tuna and smooth the top surface using a flat-edged spatula for uniformity.
2. Place the tuna sample in its original container on the fixture, ensuring it remains undisturbed to avoid inconsistent measurements.



Figure 4
 Sample before testing



Figure 5
 Sample during testing

Procedure:

1. Attach the TA43 probe to the analyzer.
2. Place the Fixture Base Table on the CTX and align it under the probe.
3. Center the tuna sample on the table and position the probe 2 mm above the sample.
4. Set test parameters in the Texture Pro software and start the test.
5. Clean the probe after each test and repeat for all samples to ensure accuracy.

Observations:

- Figure 6: Load vs. Time plot shows the hardness of different brands of canned tuna, with positive peak loads indicating the force required to penetrate each sample.
- Figure 7: Statistical results show average hardness and hardness work done for each brand:
 - Bumble Bee has the highest peak load, indicating the firmest texture.
 - Great Value shows intermediate firmness.
 - StarKist has the lowest peak load, indicating the softest texture.

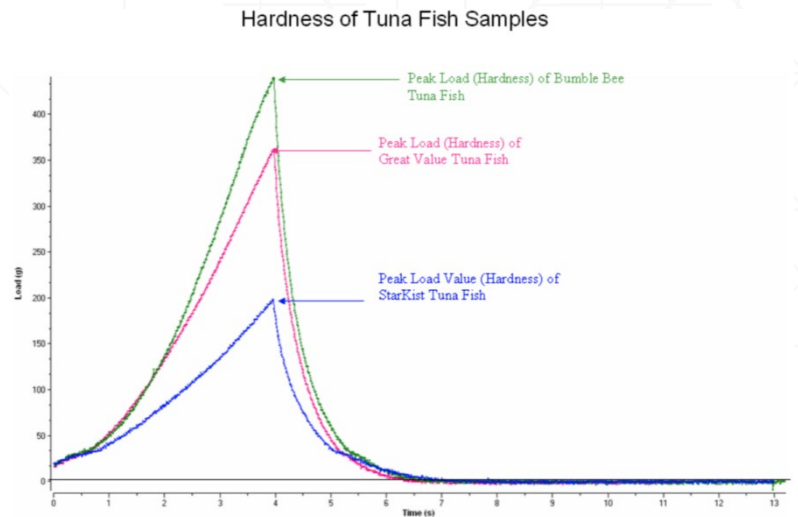


Figure 6
 Graph plot showing the forces required to compressed 3 different brands of canned tuna

Results:

- Peak Load (Hardness):
 - Bumble Bee: 440.00 g
 - Great Value: 359.00 g
 - StarKist: 198.00 g
- Hardness Work Done (mJ):
 - Bumble Bee: 6.70 mJ
 - Great Value: 6.80 mJ
 - StarKist: 3.50 mJ

#	Sample Description		Results Sample	Hardness Cycle 1 g	Hardness Work Cycle 1 mJ
	Product Name	Batch Name			
1	Tuna Fish TA43	Bumble Bee	5	440.00	6.70
2	Tuna Fish TA43	Great Value	4	359.00	6.80
3	Tuna Fish TA43	StarKist	2	198.00	3.50

Figure 7
 Statistical results of the tests performed on canned tuna samples

Discussion:

The hardness values reflect the texture differences among the brands, with Bumble Bee requiring the highest force and work, indicating a firmer texture. StarKist, with the lowest values, was the softest. Hardness measures the maximum force needed to compress the tuna, while hardness work done represents the energy needed to break down internal bonds.