

# Cat Food Pellets Hardness and Crunchiness Analysis

Testing the hardness and crunchiness of cat food pellets is crucial for ensuring texture consistency, which affects both dental benefits for cats and consumer satisfaction. By measuring hardness (peak force) and work done, manufacturers can evaluate the durability and suitability of the pellets.

## Background:

- Cat food pellets vary in texture due to ingredients (e.g., liver, chicken, beef), and each type requires separate testing. Hardness testing quantifies the force needed to compress the pellet, while the area under the curve (work done) represents the energy required to break down the pellet. Crunchiness is assessed by counting fractures during compression.

## Equipment:

- CTX Texture Analyzer with 50 kg load cell
- Components: 38.1 mm Cylinder Probe, Fixture Base Table, and Texture Pro software for data recording and analysis.

## Settings:

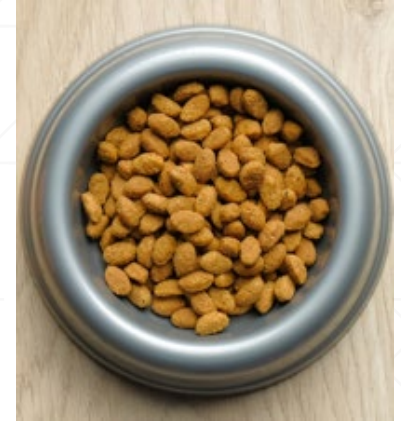
- Test Type: Compression
- Pre-Test Speed: 1.0 mm/s
- Test Speed: 2.0 mm/s
- Post-Test Speed: 2.0 mm/s
- Target Type: Percent Deformation (50% of sample height)
- Trigger Force: 10 g

## Sample Preparation:

1. Remove samples from storage and avoid moisture exposure.
2. Set the compression distance to 50% of each pellet's height, as sample sizes vary.

## Procedure:

1. Attach the cylinder probe and set up the fixture base table.
2. Position the pellet sample on the base plate, aligning it under the probe.
3. Begin the test, allowing the probe to compress the pellet to 50% deformation.
4. Clean the probe and base table between tests to ensure accurate readings.



**Observations:**

- Figure 1: Load vs. Time graph displays the hardness of each pellet type.
  - Maximum peak force indicates hardness, while fluctuations signify fractures that contribute to crunchiness.
- Figure 2: Load vs. Distance graph shows the work done to compress each pellet.
  - The area under the curve represents energy needed for pellet breakdown, with fluctuations indicating crunchiness.

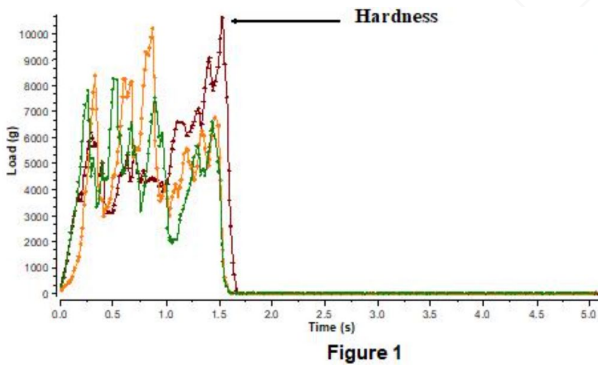


Figure 1

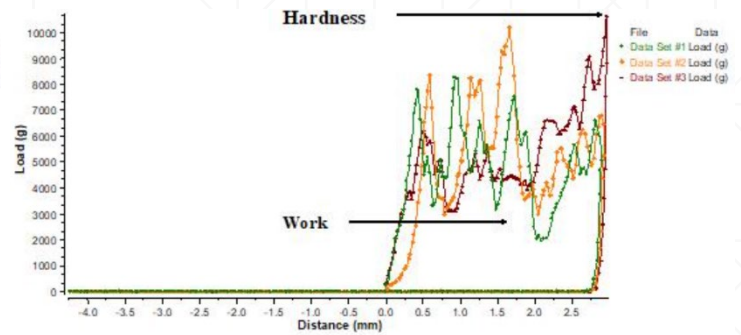


Figure 2

**Results:**

- Hardness (g):
  - Liver:  $8360 \pm 1265$
  - Chicken:  $10325 \pm 3125$
  - Beef:  $10953 \pm 821$
- Work Done (mJ):
  - Liver:  $117.5 \pm 33.5$
  - Chicken:  $144.3 \pm 33.4$
  - Beef:  $166.6 \pm 26.1$
- Fractures (Crunchiness): 12 for liver and chicken; 10 for beef.

Sample	Hardness (g)	Work Done (mJ)	Quantity of Fractures
Liver	$8360 \pm 1265$	$117.5 \pm 33.5$	$12 \pm 2$
Chicken	$10325 \pm 3125$	$144.3 \pm 33.4$	$12 \pm 2$
Beef	$10953 \pm 821$	$166.6 \pm 26.1$	$10 \pm 2$

**Discussion:**

Beef pellets were the hardest, requiring the most energy for breakdown, while liver pellets were the softest. All three types showed similar crunchiness, indicated by the number of fractures. These findings ensure product consistency and aid in optimizing texture for dental health.