

Protein Bar Dough Texture Analysis

Hardness and stickiness testing of protein bar dough is essential for quality control, ensuring each product meets desired texture and consistency. These attributes directly impact consumer satisfaction and are crucial for optimizing formulation, especially for products with varied ingredients and textures.

Background:

- Protein bar dough samples were provided, each vacuum-sealed and labeled: Chocolate Upgrade Collagen, Primal Vanilla Nut, Dark Choc Chewy, and Vegan Lemon Cookie.
- Testing focused on measuring hardness (peak load) and adhesive force by compressing samples with a conical probe to determine the force and energy required to penetrate and release from each dough type.

Test Equipment:

- Instrument: Brookfield CTX Texture Analyzer with a 5,000 g load cell
- Probe: 30 mm diameter, 60° cone probe (TA2/1000)
- Software: Texture Pro

Settings:

- Test Type: Compression
- Target Type: Distance
- Target Distance: 10 mm
- Trigger Load: 10 g
- Pre-Test Speed: 1 mm/s
- Test Speed: 1 mm/s

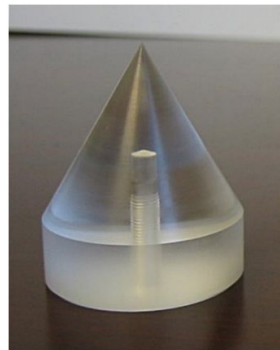


Figure 2
TA2/1000
30 mm diameter, 60° cone probe



Figure 3
Dough received for testing



Figure 1
Brookfield CTX Texture Analyzer



Figure 4
Ready for testing

Procedure:

1. Attach the TA2/1000 probe to the CTX Texture Analyzer.
2. Position and secure the Fixture Base Table on the analyzer.
3. Align each sample under the probe, positioning the probe 10 mm above the sample.
4. Set test parameters in Texture Pro and initiate the test.
5. Clean the probe after each test and repeat the procedure for all samples.



Figure 5
After testing

Observations:

- Figure 6: Load vs. Time graph shows both positive and negative peak loads for the samples.
 - The positive peak (hardness) measures the force needed to penetrate each sample.
 - The negative peak (adhesive force) represents the force required to overcome the attraction between the probe and the dough upon withdrawal.
- The Dark Choc Chewy sample exhibited the highest peak load values, indicating the greatest hardness and resistance to penetration.

Results:

- Hardness (Positive Peak Load): Dark Choc Chewy was the hardest sample, requiring the most force to compress, followed by other samples in descending order of hardness.
- Adhesive Force (Negative Peak Load): Dark Choc Chewy also showed the highest adhesive force, indicating significant stickiness compared to the other samples.

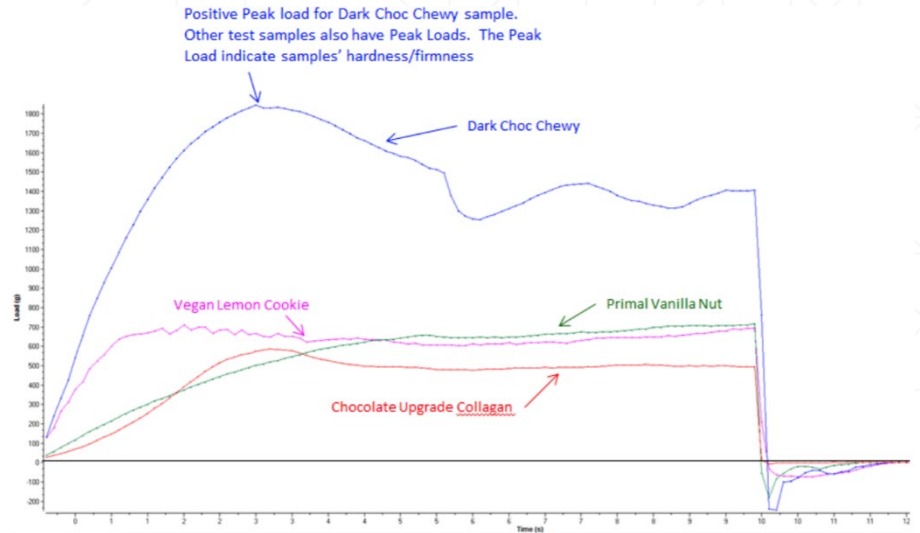


Figure 6:
 The graph above displays the positive and negative peak loads for the dough samples. The axes are Load (g) vs. Time (s).

#	Sample Description	Results	Hardness	Deformation	Hardness
Product Name	Batch Name	Sample	Cycle 1	at Hardness	Work Cycle
			g	mm	1
					mJ
1	ProteinBar Dough	ChocolateUpgCollagan	584.50	3.20	42.14
2	ProteinBar Dough	Primal Vanilla Nut	715.50	9.95	52.58
3	ProteinBar Dough	Dark Choc Chevy	1845.50	2.94	136.86
4	ProteinBar Dough	Vegan Lemon Cookie	710.50	1.98	60.10

Discussion:

The CTX Texture Analyzer effectively quantified the hardness and adhesiveness of protein bar doughs. The higher peak load and area under the curve for Dark Choc Chewy suggest it is the densest and requires the most energy for penetration and retraction. The Vegan Lemon Cookie's different graph pattern indicates a harder but more crumbly texture. This testing aids in determining the ideal firmness and consistency for protein bar formulations, enhancing product quality and consumer appeal.