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Excellence in Science

Texture Analysis for Plant-Based Meat

With heightening interest in sustainable and healthy diet lifestyles, plant-based meat is getting more and more attention these days. As demand increases for developing new products of plant-based meat, there is a corresponding focus on the flavor quality of the products.

But it's not just the taste and aroma that can define the quality of foods. Texture assessment is an essential parameter for evaluating food quality, especially when discussing meat-mimicking products. Material testers with appropriate jigs can clarify the properties related to the texture, such as hardness.

Material Testing Analysis for Texture

Material testing instruments can assess the texture of food samples without any partiality.

Sample Preparation
- Four different commercially available plant-based meat products (Product 1 to 4).
- They are all substitutes for ground beef and were cooked before analysis.
- 25 g of the samples were compressed to the same shape mold. The mold is truncated-cone-shaped with an upper and lower diameter of 2.5 cm and 4 cm, respectively.
- The molded samples were then put into a 200 °C oven for 20 min. The samples were tested when the internal temperature was around 65 °C.

Material Tester Analysis

Instrument	EZ Test
Software	TRAPEZIUMX Texture

The force profile when a jig starts pressing the sample is recorded. A cylinder-shaped jig whose diameter is 10 mm was moving down with constant velocity until it completely penetrated the sample. The profile recorded in this experiment is shown in Fig. 1. Force profiles are basically similar to each other, though there are slight differences in their shape.

This difference should be reflected in each sample's property of texture. The test force indicates hardness. The larger the test force, the higher the hardness. A longer time to max force or a longer stroke to max force indicates more cohesiveness.
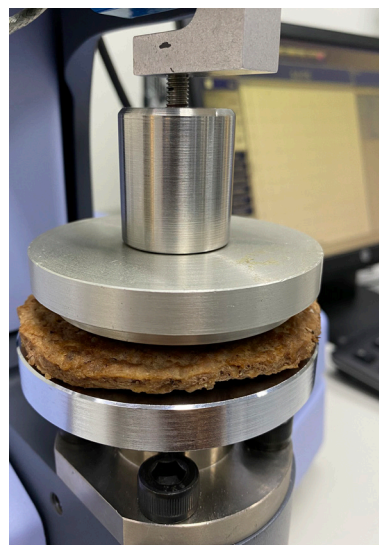
▲ Tabletop Food Texture Analyzer EZ-X
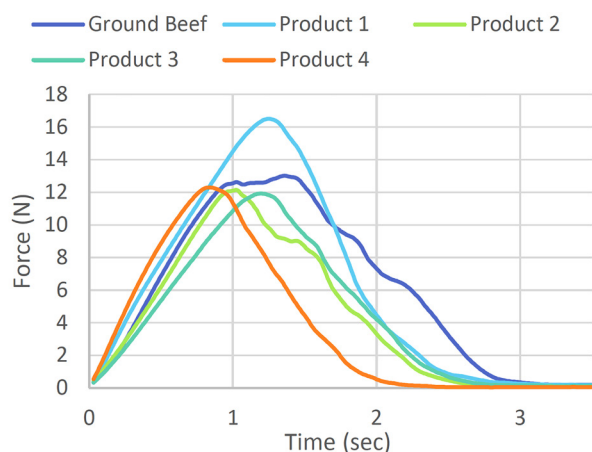
◄ **Fig. 1**

- Force profile of the ground beef and four plant-based meats.
- The jig slowly goes down directed to the sample and touches its surface when time is 0.
- The force grows larger and reaches its apex when the sample cracked and collapsed.
- Thereafter the force gradually decreases and reaches almost 0 when the jig completely penetrates the sample.
- A peak was detected from each sample at a certain point. This point, max force at the point, and waveform can be an evaluation index for hardness, cohesiveness, and so on. We can quantify the texture of food in this matter.

Taste, aroma, and texture are important independent factors and should be discussed separately. However, we sometimes want to rate the "total quality" of the food products. Shimadzu can provide a fuller compliment to your food testing with our LC-MS and GC-MS. Opening the possibility to assess the total quality of plant-based meat products.`

LCMS-8050	GCMS-TQ8050 + AOC-6000	EZ Test
Taste	Aroma	Texture

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