SHIMADZU

Application News

Material Testing System No.255

Texture Evaluation of Cheese and Agar Jelly

There are various factors to determine the tastiness of foods including the five senses; sight, taste, smell, touch, and hearing as well as physiological factors such as the state of hunger and full stomach, psychological factors, and dietary habits. It has been generally clarified that physical matters heavily influence sensory factors.
Texture evaluation is a way to convert physical senses (texture) into numerical values. Properties can be calculated as hardness, brittleness, cohesion strength, cohesiveness, elastic quality, cohesive quality, and adhesion as representative values.
The section below introduces the results of a mastication test and shearing test conducted on cheese and agar jelly using the EZ Test Shimadzu Compact Table-Top Testing Machine as a texture evaluation example.

1. Mastication Test on Cheese and Agar Jelly

A mastication test was conducted using load cell 20N and compression test jig (3 mm dia. plunger type) on the EZ Test Shimadzu Compact Table-Top Testing Machine in two cycles from 0 to 6 mm compression at a test speed of 50 mm/min. (Fig.1)
Figs.2 and 3 show the test force-displacement curve of each sample. Table 1 shows representative physical properties calculated based on the data.
The test results clearly show that the texture evaluation showcased the difference between cheese and agar jelly in their physical properties. It is evident that the differences in their properties described below were accurately converted into numerical values. Agar jelly is chewier, more brittle and lighter in texture, and harder to stick to the teeth as compared to cheese.

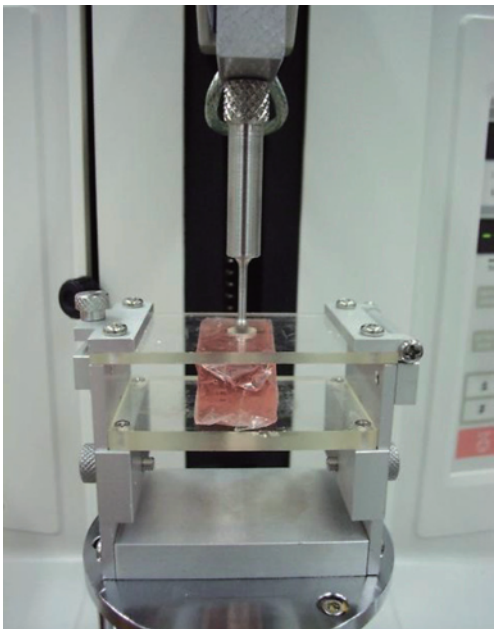


Fig. 1 Mastication Test

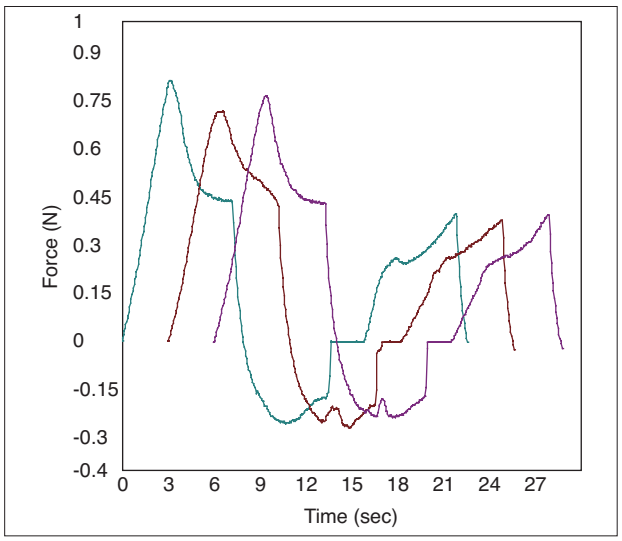


Fig. 2 Force-Displacement Curve for Cheese

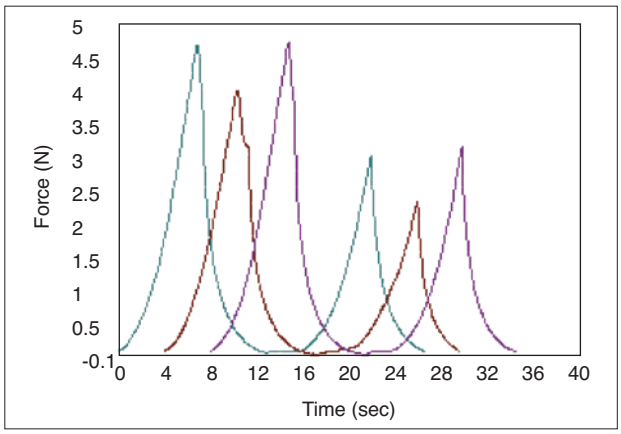


Fig. 3 Force-Displacement Curve for Agar Jelly

Table 1 Texture Evaluation Values of Cheese and Agar Jelly (Mastication Test)

Parameter	Hardness	Cohesion Strength	Cohesiveness	Indentation	Cohesive Quality	Elastic Quality	Gum Quality	Masticable Quality
Unit	N	N	J	mm				
Agar Jelly	4.48	-0.04	-0.0001	5.58	203.358	1.08529	916.504	988.558
Cheese	0.77	-0.25	-0.00095	2.84	132.789	2.14723	102.315	220.447

2. Shearing Test on Cheese and Agar Jelly

A shearing test was conducted using a shearing jig to evaluate hardness and chewiness as evaluation examples just like the mastication test described above. (Fig.4)
Figs.5 and 6 show the force-displacement curve of each sample as the test results.
The data also clearly indicate the difference between the properties of cheese and agar jelly.

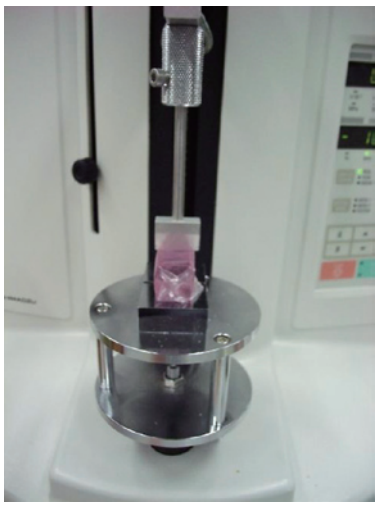


Fig. 4 Shearing Test

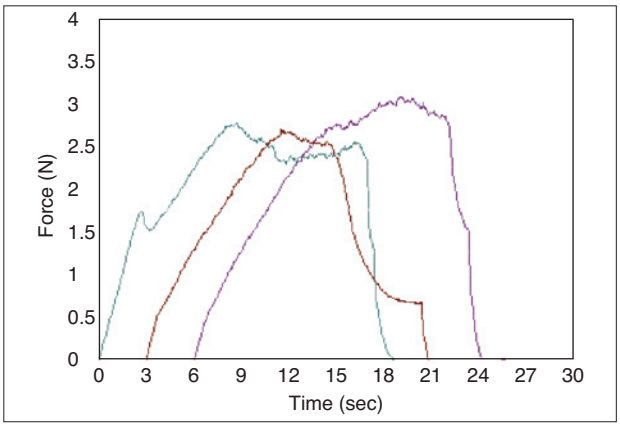


Fig. 5 Force-Displacement Curve for Cheese

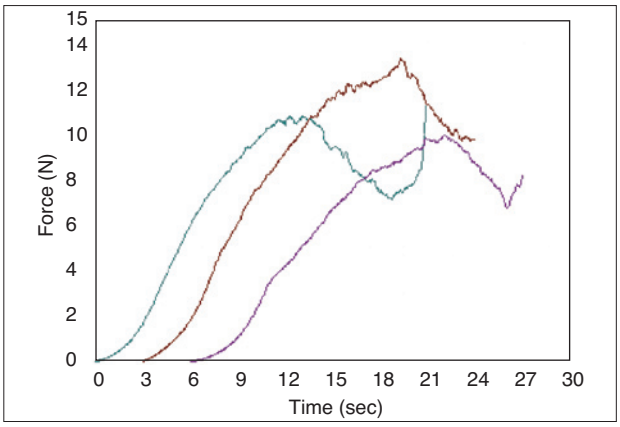
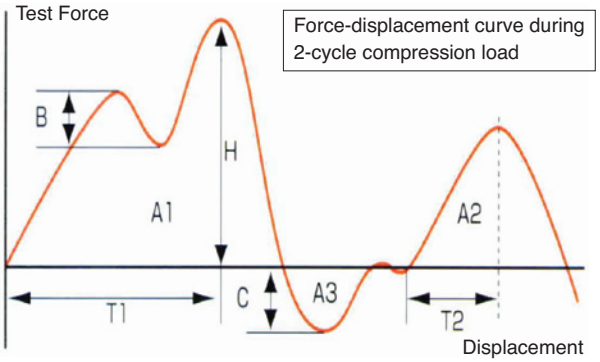


Fig. 6 Test Force-Displacement Curve for Agar Jelly

As shown in the examples above, using the EZ Test Shimadzu Compact Table-Top Testing Machine, a wide range of texture measurement can be easily conducted by adding various test jigs (there is a wide range of variation) for compression, shearing, and other purposes as well as the functions of a texture software.

[Reference]
Major texture evaluation terms

H : Hardness	A2/A1	: Cohesive Quality
B : Brittleness	T2/T1	: Elastic Quality
C : Cohesion Strength	H × A2/A1	: Gum Quality
A3 : Cohesiveness	H × A2/A1 × T2/T1	: Masticable Quality
T1 : Indentation		



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