LAAN-A-AG-E005

SHIMADZU

Application News

Material Testing System No.235

Measurement of Texture Characteristics of Rice Using the EZ Test Shimadzu Texture Analyzer

1. Introduction

Recently, numerical conversion of texture of materials and products is becoming more important. Especially in the food industry, various types of evaluation are performed on a wide range of materials, from raw ingredients to product packaging for quality assurance and development of new products. The EZ Test Shimadzu Texture Analyzer is used for various purposes such as numerical conversion of texture characteristics of foods such as chewiness, firmness, and palatability; quality evaluation based on the change of hardness; and strength evaluation of food packaging. The Analyzer is usable for such a wide range of purposes because a wide variety of jigs can be selectively used according to the type of test being performed.
We conducted texture characterization of rice using the Texture Analyzer.

2. Samples and Testing Machines

Three types of rice; blended rice, Koshihikari (one of the most popular brands of rice), and rice with barley were used as samples in the measurement. Fig. 1 shows the appearance of the EZ Test Shimadzu Texture Analyzer used in the measurement. The analyzer has an exceptionally operable, compact frame and is perfect for texture characterization of foods. Table 1 shows the process to make test pieces and table 2 shows the configuration of the system used for the measurement.

Table 1 Test Piece Making Process

(1)	Rice was cooked and left as is for one hour.
(2)	Rice was made into 10 g units.
(3)	Each unit of rice was then formed with a mold into a 20 mm high cylindrical form with a diameter of 25 mm.

Table 2 System Configuration

Main Unit	EZ Test
Load Cell	Capacity 100 N
Jig	50 mm dia. compression plate
Software	TRAPEZIUMX Texture

Fig. 1 Appearance of Texture Analyzer

3. Test Conditions

Table 3 shows test conditions.
Fig. 2 shows how a test piece is placed.

Table 3 Test Conditions

Test Speed	50 mm/min
Pressing Amount	15 mm
Temperature	28 °C
Humidity	60 %

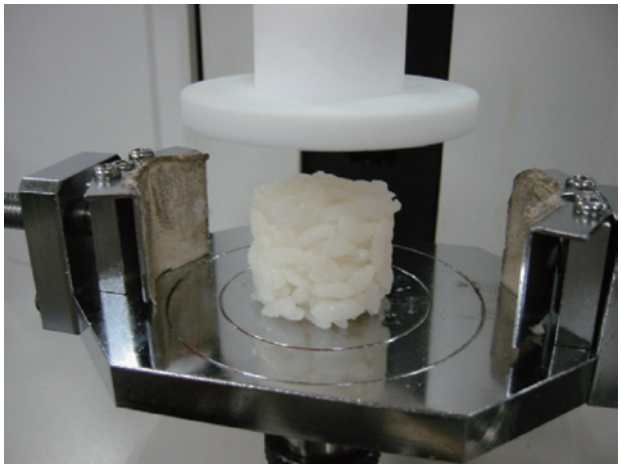

Fig. 2 Test Piece Placed

4. Test Results

Table 4 shows "Summary of Test Results (Average Values)" and Fig. 3 shows a "Force-Time" measurement example.

Table 4 Summary of Test Results (Average Values)

Sample	Hardness [N]	Cohesion Strength [N]	Cohesiveness [Nmm]
Blended Rice	7.86	0.54	0.967
Koshihikari	16.3	1.09	2.78
Rice with Barley	7.67	0.33	0.603

Hardness : The maximum force loaded when compressed
Cohesion Strength : The maximum force required to pull off the jig after compression
Cohesiveness : A value calculated by multiplying the force required to pull off the jig after compression by the distance

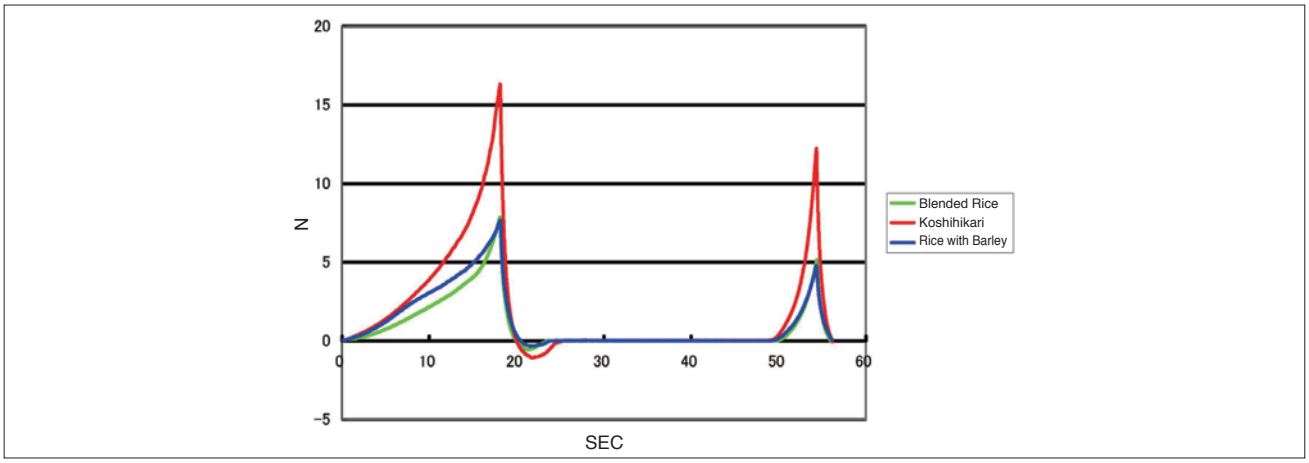

Fig. 3 Force-Time Graph

5. Summary

Koshihikari showed over twice as high values as compared to the other two types of rice for all items; hardness, cohesiveness, and cohesion strength. Cohesiveness is believed to closely indicate the sensation people fell when they actually eat rice. The test result for cohesiveness clearly indicates Koshihikari's characteristics.
The use of the EZ Test Texture Analyzer is recommended for evaluating food texture because it provides easier texture characterization as compared to sensory evaluations and is highly operable.

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