SHIMADZU

Application News

No.i246

Material Testing System

Texture Evaluation of Care Food

Introduction

The development of care food, which is processed to be soft and easy to eat, is steadily progressing to the point that the shape, color and taste are nearly indistinguishable from ordinary food, except that the texture is softened to enable crushing using just the gums and tongue. These commercially available products are a great boon to the elderly and individuals with internal mouth injuries who may have inadequate strength for chewing and drinking, and are helping these disadvantaged groups to better enjoy the pleasures of tasting and eating. Meanwhile, according to the Health Promotion Law in Japan, the Japan Consumer Affairs Agency is authorized to conduct reviews of the suitability of "foods for people with dysphagia" as regulated special purpose foods, and based on these reviews, permit the display of such foods.

Here, we conducted measurements of commercially available care food based on the test methods specified for reviewing the suitability of foods for people with dysphagia. We then classified the food according to the specific standard based on the obtained hardness, adhesiveness, and cohesiveness data.

Testing Equipment and Specimens

The instrument used for this evaluation was the Shimadzu EZ Test Texture Analyzer, with a 5N test force measurement load cell. The samples used consisted of 3 commercially available care food products (sample names: A – C).

Test Conditions

An overview of the measurement setup is shown in Fig. 1. The sample diameter was 40 mm, and the sample was loaded to a height of 15 mm in the 20 mm high sample container. Using a plastic plunger 20 mm in diameter and 8 mm in height, compression testing was conducted twice at a speed of 10 mm/sec with a clearance of 5 mm. The test was conducted using a sample temperature of 20 °C.

Test Results

The results obtained from testing of 3 types of food products are shown in the force – time graphs of Fig. 2 – Fig. 4.

Fig. 1 Overview of Texture Test

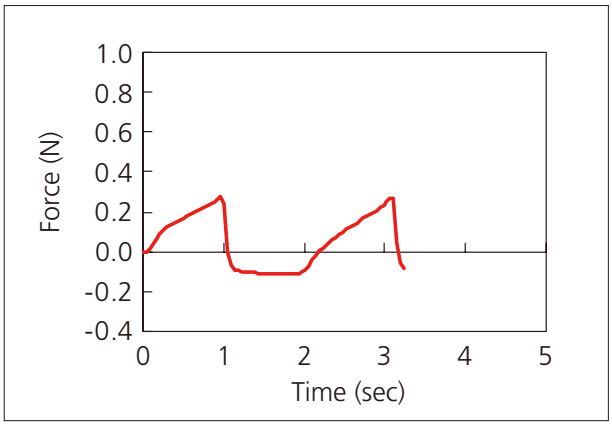

Fig. 2 Food A (vegetable soup)

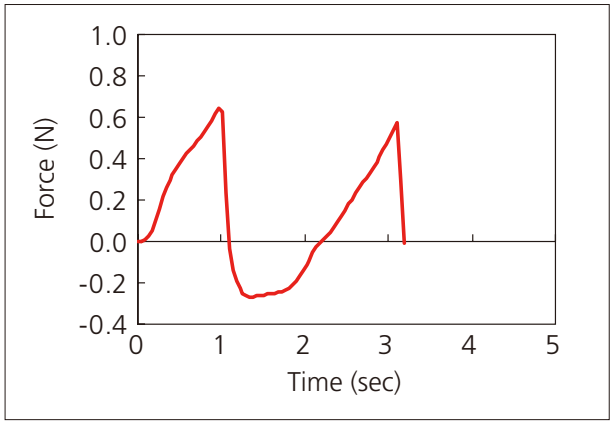

Fig. 3 Food B (rice gruel)

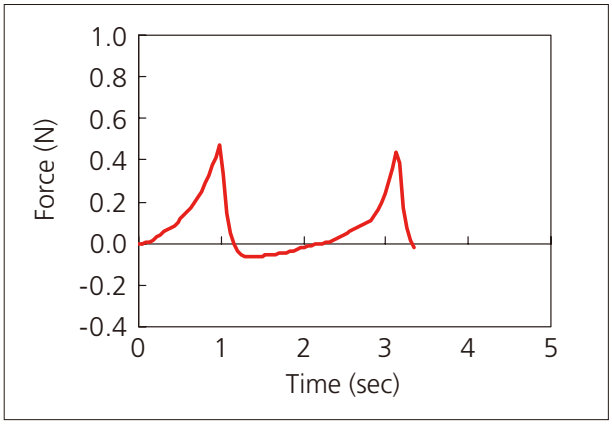

Fig. 4 F ood C (sukiyaki)

The results obtained from the series of measurements are shown in Table 1.

Table 1

Sample	Hardness		Adhesiveness		Cohesiveness		Permissible Standard (Overall Judgment)
	Measured Value (N/m^2)	Judgment	Measured Value (J/m^3)	Judgment	Measured Value	Judgment	
Food A	0.84×10^3	Ⅰ, Ⅱ, [Ⅲ]	0.19×10^3	Ⅰ, [Ⅱ], [Ⅲ]	0.82	Ⅰ, [Ⅱ]	Ⅲ
Food B	1.97×10^3	Ⅰ, [Ⅱ], [Ⅲ]	0.41×10^3	Ⅰ, [Ⅱ], [Ⅲ]	0.76	Ⅰ, [Ⅱ]	Ⅲ
Food C	1.88×10^3	Ⅰ, [Ⅱ], [Ⅲ]	0.08×10^3	[Ⅰ], [Ⅱ], [Ⅲ]	0.52	[Ⅰ], [Ⅱ]	Ⅲ

The measured values for hardness, adhesiveness and cohesiveness that are within the range of the permissible standard are indicated with a □ that surrounds the standards in the Judgment field. Food A does not satisfy the hardness standards Ⅰ and Ⅱ, so the permissible standard was designated as Ⅲ. In the case of foods B and C, item Ⅰ is not satisfied, so the permissible standard would be presumed to be Ⅱ. However, the permissible standard becomes Ⅲ in the final evaluation, because food B and food C contain non-homogeneous ingredients. Thus, by defining the numerical value and comparing it with the judgment standards, the judgment can be made as to which permissible standard it corresponds.

[Reference]
(Permissible Standards of Foods for People with Dysphagia Note 1))
Note 1) Regarding permission to display special usage foods (Excerpted from Ministry of Health, Labour and Welfare Food Safety Notification No. 0212001)

Standard*1	Permissible Standard Ⅰ *2	Permissible Standard Ⅱ *3	Permissible Standard Ⅲ *4
Hardness (Resistance during compression at constant rate) (N/m^2)	2.5×10^3 - 1×10^4	1×10^3 - 1.5×10^4	3×10^2 - 2×10^4
Adhesiveness (J/m^3)	4×10^2 or less	1×10^3 or less	1.5×10^3 or less
Cohesiveness	0.2 - 0.6	0.2 - 0.9	-

*1 Within the permissible range of the standard under conditions of either of ambient temperature or the normal temperature at which eating takes place.
*2 Homogeneous items (for example, jellied foods)
*3 Homogeneous items (for example, jellied or smooth foods). However, this excludes foods that satisfy permissible standard Ⅰ.
*4 Includes non-homogeneous foods (for example, rice gruel which is easily clumped or collected, soft paste-like or jellied foods). However, this excludes foods that satisfy permissible standard Ⅰ or permissible standard Ⅱ.

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