

Application News

Material Testing System

No.166

Measurement of Texture of Pork by a Penetrating Strength Test

Today, Japanese people eat more pork than any other type of meat, 10 kg per person per year. Let's look at the history of eating pork in Japan. Generally, it is believed that Japanese people started to eat pork in the Meiji Era (1868-1912). In ancient times, they ate wild boar meat. It has been discovered that people kept wild boar during the Yayoi Era (1000 BC to 300 AD). It is imagined that people kept them free-range instead of penned in cages, fed them leftover food scraps, and ate them during festivals or special occasions.

People nowadays like tender meat more than chewy meat. Therefore, various measures are taken to make

pork tender, for example by soaking it in water or in protein degrading enzyme solution to quickly achieve an adequate level of tenderness.

Two cuts of store-bought Boston pork butt were soaked for 20 hours, one in water and the other in a protein degrading enzyme solution. A penetrating strength test was then performed on them and their textures were converted into numerical values for comparison. Fig. 1 is the penetrating test force-penetrating depth curve of store-bought Boston pork butt. Fig. 2 shows how the penetrating strength test was performed.

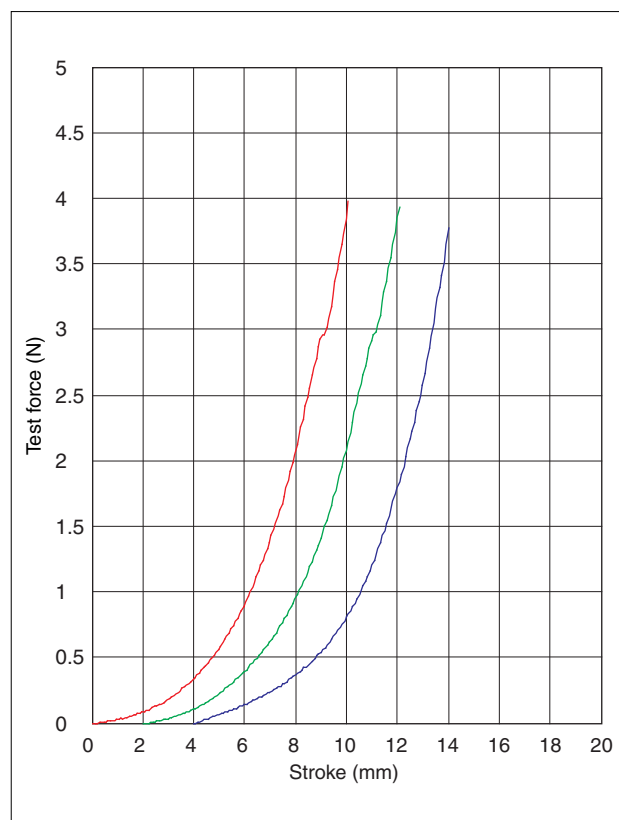


Fig. 1 Penetrating Test Force- Penetrating Depth Curve on Store-Bought Boston Pork Butt



Fig. 2 Penetrating Strength Test Being Performed on Pork

The EZ Test Shimadzu Table-Top Universal Tester was used in the test.

Fig. 3 is the penetrating test force-penetrating depth

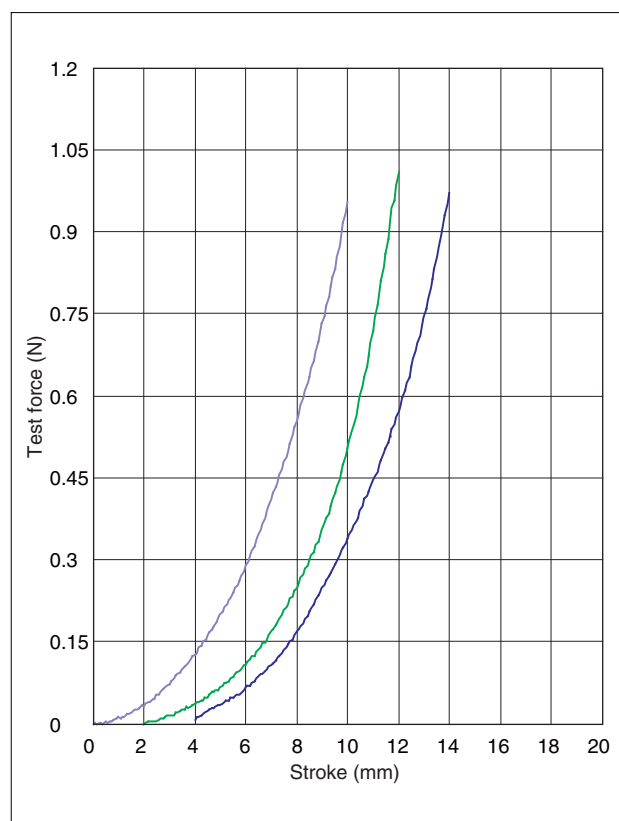


Fig. 3 Curve of Pork Soaked in Water for 20 Hours

In these tests, the strength was measured at the point where a 5 mm diameter penetration elasticity jig penetrated a 20 mm thick cut of Boston Pork Butt to a depth of 10 mm at a speed of 100 mm/min. When the results shown in Fig. 3 and Fig. 4 are compared, the jig went deeper into the pork soaked in enzyme solution for 20 hours as compared to the pork soaked in water for 20 hours when the same test force was used, indicating the former is more tender.

curve of pork soaked in water for 20 hours. Fig. 4 shows the results of soaking meat in a protein degrading enzyme solution for 20 hours.

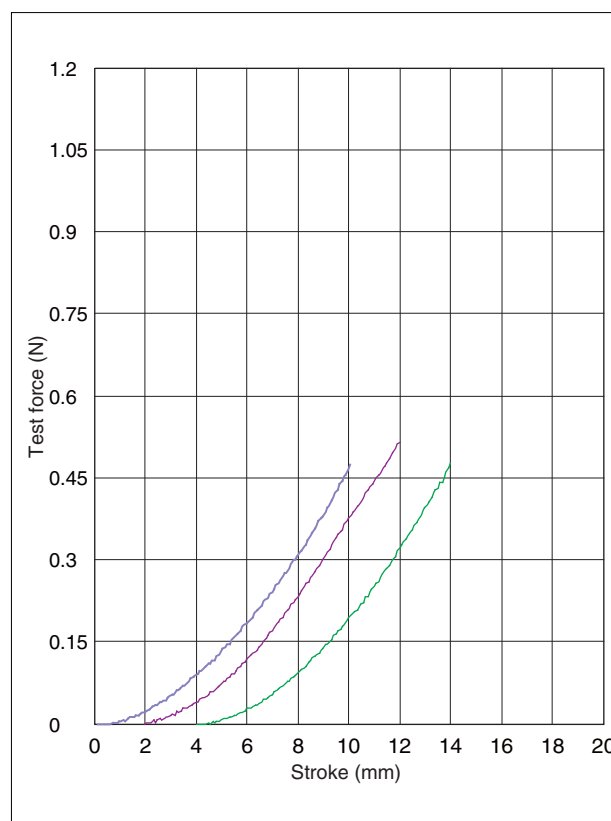


Fig. 4 Curve of Pork Soaked in Enzyme Solution for 20 Hours

When Fig. 1 and Fig. 3 are compared, approximately four times the strength is necessary to penetrate store-bought pork to the same depth as pork soaked in water for 20 hours, clearly indicating the difference in hardness. As shown in these figures, the texture of pork was converted into numerical values from the pork penetrating test strength- penetrating depth curve. Table 1 below shows the maximum penetrating test strength of these three tests.

Table 1

Sample	Average Value of Maximum Test Force N
Store-Bought Boston Pork Butt	3.90
Boston Pork Butt Soaked in Water for 20 hours	0.98
Boston Pork Butt Soaked in Enzyme Solution for 20 hours	0.49

The EZ Test Shimadzu Table-Top Universal Tester can be used to convert texture-related properties such as crispness of croquettes, resilience of bread, and

firmness of boiled fish paste (kamoboko) as well as tenderness of pork reported in this document.