

APPLICATION

Determination of curd strength.

TEST OBJECTIVE

Determine strength of curd as an aid in grading the quality of tofu and other curd products.

TEST PRINCIPLE

Curd sample to be tested is placed on test table. The curd probe kit consists of three probes used to compress the sample until it ruptures. The curd strength is defined as the peak load at rupture.

BACKGROUND

Tofu curd strength testing has traditionally been performed using a motorized stage to lift the curd sample toward the test probe, which would unload a weighted spring causing the probe to apply increasing force on the sample. The operator was required to watch a mechanical pointer as it moved over a scale of 0-100 until it suddenly collapsed as the probe punctured the sample. The highest scale reading observed was taken to be the curd strength.

Due to the limited load range of this machine, probes of three sizes were necessary. The small 5 mm diameter probe was used to test extra firm curd. This allowed a moderate load on the probe to apply a relatively high stress on the sample. On the other hand, the 10 mm diameter probe was used to test soft curd. This allowed the relatively low stress at rupture to result in a moderate load on the probe. The development of 10 mm, 8 mm and 5 mm diameter probes was therefore necessary. The CT3 using a 1000 g Load Cell provides sufficient capacity to test all three types of curd with one probe. Three curd probes are provided to allow easy correlation with existing methods. This allows a seamless transition to modern equipment without the need to change criteria for firmness grades.

EMPIRICAL FACTORS

The “trigger value” is the load in grams, which must be exceeded to begin the test. This is used to indicate the position of the sample surface and allows the test to begin. After triggering, the probe will travel to the target distance at the preset speed.

When setting the target distance for the test, sample thickness must be considered as well as the expected deformation to

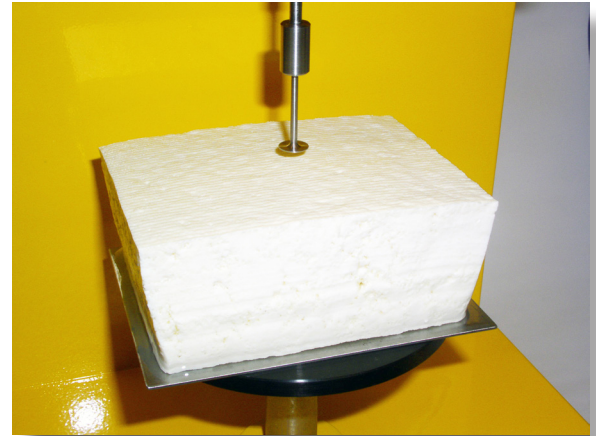


Figure 1: TA46, TA47 and TA48 Probes

Table 1:
CT3 Method

TEST:	Normal
TRIGGER:	3 g
DISTANCE:	40 mm*
SPEED:	4 mm/s
* varies by sample	

rupture. A soft curd product 40 mm thick might rupture after only 10 mm of penetration, whereas an extra firm product with the same thickness might deform 20 mm before rupturing. The target distance must be set sufficiently high to exceed the deformation required for rupture.

RESULTS

Mechanical Scale	10	20	30	40	50	60	70	80	90	100
CT3 in grams	21	41	52	83	104	124	145	166	186	207

DISCUSSION

In order to obtain accurate curd strength results for tofu puncture, test probes of specific geometry and dimensions are required. Probes are shown in photo (Figure I). Typically, a test of extra firm tofu uses the 5 mm diameter probe TA46. A test for firm tofu would use the 8 mm diameter TA47 probe, and the test for soft tofu would use the 10 mm diameter probe TA48. These probes, when used with the CT3, provide results identical to those used in the traditional mechanical method described above, with one exception. The mechanical scale range of 0-100 is equivalent to 0- 207 g. The CT3 Texture Analyzer reads directly in grams, so the expected results must be correlated according to the table above.

CONCLUSION

The modern, user friendly, low cost texture analyzer, Model CT3, can be used for Quality Control testing of tofu and other curd products. A set of Curd probes is the only items necessary to complete the system.



Figure II