

## Red Meat Properties – Double Cycle Compression

### TVT Texture Analyzer

The TVT Texture Analyzer (Figure 1) offers rapid and objective analysis for all kinds of products. The following parameters can be characterized for your product category.

- Firmness
- Springiness
- Resilience
- Cohesiveness
- Gumminess
- Chewiness

Both international standard methods as well as customer tailor-made profiles are available.



Figure 1: TVT Texture Analyzer

### Scope

- Determination of red meat properties by double cycle compression.

### Method Description

The recording of the measurement data commences once the probe reaches the pre-set trigger force. The probe will then compress the sample to a pre-defined strain of the sample height. After the first compression, the probe returns to its starting position before the second compression begins. A pre-set hold time decides when the second compression starts. After the double compression, the probe returns to its starting position.

### Calibration

Make sure the instrument is correct calibrated before the measurements. How to perform the calibration can be found in the User's Manual.

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Load cell (recommended) 15-30kg

#### Probe

P-CY20S, Cylinder probe 20 mm diameter, stainless steel  
Part number: 67.30.20 (Figure 2)



Figure 2: P-CY20S

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## Profile settings

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### Setting Parameter

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Multiple Cycle Compression

Sample height [mm]	25.0
Starting distance from sample [mm]	5.0
Number of cycles	2
Compression [%]	50.00
Paus [s]	0
Initial speed [mm/s]	2.0
Test speed [mm/s]	2.0
Retract speed [mm/s]	2.0
Trigger force [g]	20
Data rate [pps]	200

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## Sample preparation

Cut out (along with the fibers) a cylinder shaped piece of the meat/meat product with the dimensions  $\approx 15$  mm in diameter and 25 mm in height. Place the sample on the measuring table and center it below the probe. Make sure that all samples are placed and measured with the same fiber direction and that the samples have an equal test temperature.

## Curve Description

In Figure 3 a typical Force–Distance compression cycle curves is illustrated. The two peaks are representing the force required during the two compressions in the cycle. Force A and Force B represents maximum firmness for first and second compression respectively. Force A is defined as the firmness. Springiness is a type of recovery measurement of the sample and gives a value to what extent the sample springs back after the deformation during the first compression. The springiness is here measured as the compression distance for the second peak (y) divided with the compression distance for the first peak (x) (Figure 3).

$$\frac{y}{x} \times 100 = \% \text{ Springiness}$$

Resilience is the work of withdraw for the first peak ( $a_1$ ) divided with the work of compression for the same peak ( $a_1$ ).

$$\frac{a_2}{a_1} = \text{Resilience}$$

Cohesiveness is the area of the second peak (B) divided with the area of the first peak (A).

$$\frac{B}{A} = \text{Cohesiveness}$$

Gumminess and Chewiness are calculated as follow:

$$\text{Gumminess} = \text{Firmness} \times \text{Cohesiveness}$$

$$\text{Chewiness} = \text{Gumminess} \times \text{Springiness}$$

The pre-set wait time between the two compressions is important for some products, where a too long wait time will allow the sample to spring back more than it would do under its normal conditions.

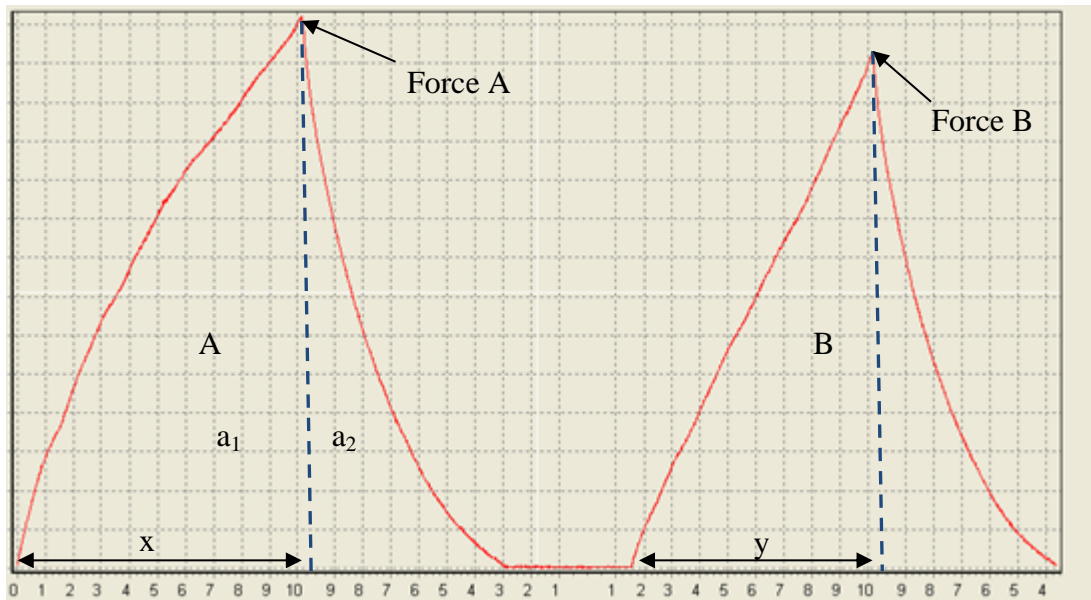


Figure 3: Example of a double cycle compression test

### Data Analysis

The force required to compress the sample to a certain strain of the sample height is here defined as firmness and can be measured in the units [g] or [N]. Springiness is given as a percentage (%) value. Except raw data (force, time and distance) the program also directly provides calculated results such as *mean value* and *standard deviation*.