Salmon Feed Pellets Properties – Double Cycle Compression

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

- Hardness
- Fracture Force
- Break Force
- Springiness/Elasticity

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

![TVT Texture Analyzer](image1)

**Fig. 1 TVT Texture Analyzer**

**Scope**
- Determination of salmon feed pellets 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 percentage of the sample’s height. After the first compression, the probe returns to its starting position before the second compression begins. A pre-set wait 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)** 50 kg

**Probe**
P-CY35S, Cylinder probe 35 mm diameter, stainless steel
Part number: 67.30.35 (Figure 2)

![P-CY35S](image2)

**Figure 2: P-CY35S**
Profile Settings

<table>
<thead>
<tr>
<th>Setting Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample height [mm]</td>
<td>10.0</td>
</tr>
<tr>
<td>Starting distance from sample [mm]</td>
<td>5.0</td>
</tr>
<tr>
<td>Number of cycles</td>
<td>2</td>
</tr>
<tr>
<td>Compression [%]</td>
<td>7.00</td>
</tr>
<tr>
<td>Paus [s]</td>
<td>5</td>
</tr>
<tr>
<td>Initial speed [mm/s]</td>
<td>1.0</td>
</tr>
<tr>
<td>Test speed [mm/s]</td>
<td>1.0</td>
</tr>
<tr>
<td>Retract speed [mm/s]</td>
<td>1.0</td>
</tr>
<tr>
<td>Trigger force [g]</td>
<td>10</td>
</tr>
<tr>
<td>Data rate [pps]</td>
<td>200</td>
</tr>
</tbody>
</table>

Sample preparation
Take the sample directly from storage and center it below the probe. Commence the test.

Curve Description
In Figure 3 a typical Force-Time curves is illustrated for double compression of the sample. The two peaks are representing the force required during the two compressions in the cycle. Force A and Force B represents maximum force for first and second compression respectively. Force A is defined as the hardness. Springiness is a type of recovery measurement of the sample and gives information 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).

\[
\frac{\text{Distance } y}{\text{Distance } x} \times 100 = \% \text{Springiness}
\]

Resilience is the area from the withdraw (a2) divided with the compression area (a1).

\[
\frac{\text{Area } a_2}{\text{Area } a_1} = \text{Resilience}
\]

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

\[
\frac{\text{Area } B}{\text{Area } A} = \text{Cohesiveness}
\]

The pre-set pause 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.
Data Analysis
The force required to penetrate the sample to a certain distance is here defined as hardness and can be measured in the units [g] or [N]. Springiness is given as a percentage [%] value and the distances in [mm]. Except raw data (force, time and distance) the program also directly provides calculated results such as mean value and standard deviation.