ISO 9001 CERTIFIED
BROOKFIELD
AMETEK

TEXTURE ANALYSIS APPLICATION NOTE:

# Crème Fraiche

## TEST PRINCIPLE

Evaluation of the consistencies of full-fat and low-fat Crème Fraiche by back extrusion.

## BACKGROUND

Crème Fraiche is a cultured cream that is thickened by natural lactic bacteria to produce a creamy delicate texture. The high fat content in the product increases the moisture content, further softening the product.

Research has shown that homogenization and pasteurization conditions of the cream can affect the viscous and elastic properties of Crème Fraiche. Monitoring the texture of Crème Fraiche is therefore necessary. Using the CT3 Texture Analyzer with a back extrusion cell, product consistency and firmness can be determined. In the test, the extrusion plunger compresses the sample over a specified distance during which time the sample is deformed and packed more tightly into the remaining space available (under the descending probe). As the sample becomes very compact with limited air pockets, the force increases. Then the back extrusion commences with sample material flowing around the edge of the plunger as it pushes downward. The back extrusion test is useful for viscous products, and the products can be tested directly from the production line.

## METHOD

EQUIPMENT:
- CT3 with 4.5 kg load cell
- Back Extrusion Cell with a 38.1 mm disc (TA-BEC)
- Fixture Base Table (TA-BT-KIT)
- TexturePro CT Software

SETTINGS:

| | |
|---|---|
| Test Type: | Compression |
| Pre-Test Speed: | 1.0 mm/s |
| Test Speed: | 1.0 mm/s |
| Post-Test Speed: | 1.0 mm/s |
| Target Type: | Distance |
| Target Value: | 30 mm |
| Trigger Force: | 10.0 g |

## SAMPLE PREPARATION

Samples can be tested from their original containers or placed into a standard size back extrusion container. If using a standard extrusion container, the sample should fill up no more than 75% of the container depth. The samples must also be tested immediately after removal from storage (refrigerator).

## PROCEDURE

1. Attach the 38.1 mm disc (extrusion plunger) to the load cell.
2. Place the fixture base table to the base of the instrument and loosely tighten the thumb screws to enable some degree of mobility.
3. Insert a plate (if testing the sample from its original container) onto the fixture base table and tighten into position using the side screws. Otherwise, the standard extrusion container containing the sample is placed directly on the base of the instrument.
4. Place the sample on the fixture base table if in its original container.
5. Lower the probe to a few centimeters above the sample surface.
6. Position the sample container centrally under the extrusion plunger by re-positioning the fixture base table so that the probe can fully penetrate the container without touching the rim of the container.
7. Once alignment is complete, tighten the thumb screws of the fixture base table to prevent further movement.
8. Select a specified starting distance e.g., 10 mm above the top of the container or sample surface. This will ensure the probe returns to the same position above the sample after each test enabling comparisons of cohesiveness and 'work of cohesion' of samples.
9. Commence the penetration test.

**Note**: Samples can be tested directly from their containers. When comparing between samples, always ensure that the container size, temperature and volume of sample is the same and make mention of them in the report. It is however preferable to test directly from sample containers so as to avoid tampering with the set product.

The distance of extrusion will vary depending on the depth of the sample in the container and the depth and shape of the container. Typically, the chosen depth should not exceed 75% of sample depth. This will prevent base effects and instrument overload caused by the plunger coming into contact with the base of the container.

The hardest sample is best tested first in order to predict the maximum testing range for subsequent samples.

## RESULTS

The graphs show the consistencies and firmness of full-fat and low-fat Crème Fraiche by back extrusion.

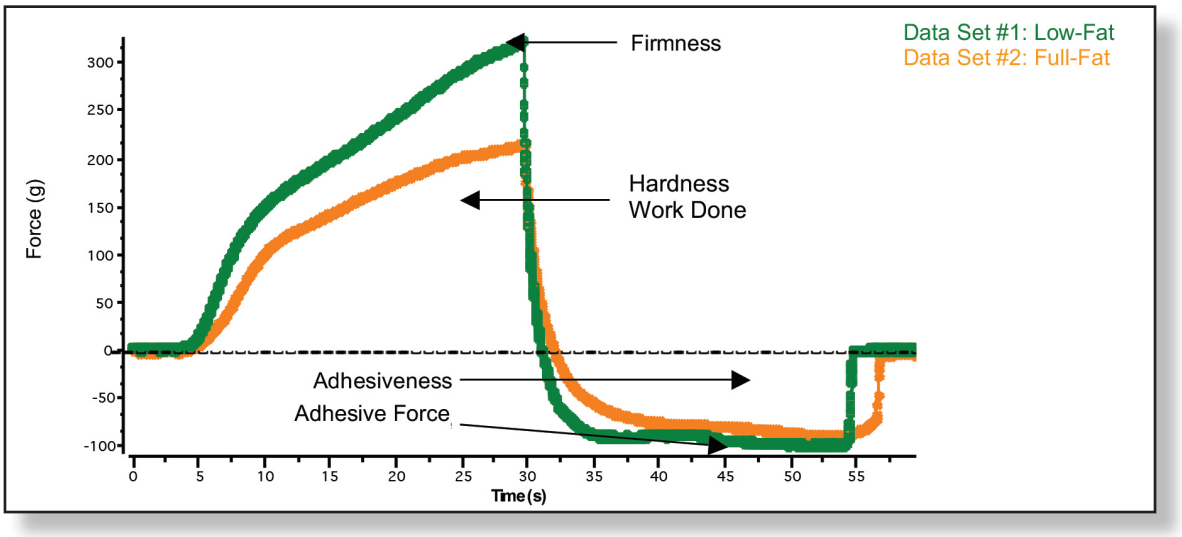


Figure I

Figure I shows the extrusion of full-fat and low-fat Crème Fraiche stored at 6°C by back extrusion. Tests have been carried out at room temperature and from the original sample containers. The maximum peak on the graph is a measure of sample hardness. The area under the positive peak from the start of the test to the maximum load is a measure of hardness work done. The maximum negative peak is a measure of adhesive force. The area above the negative peak is a measure of sample adhesiveness.

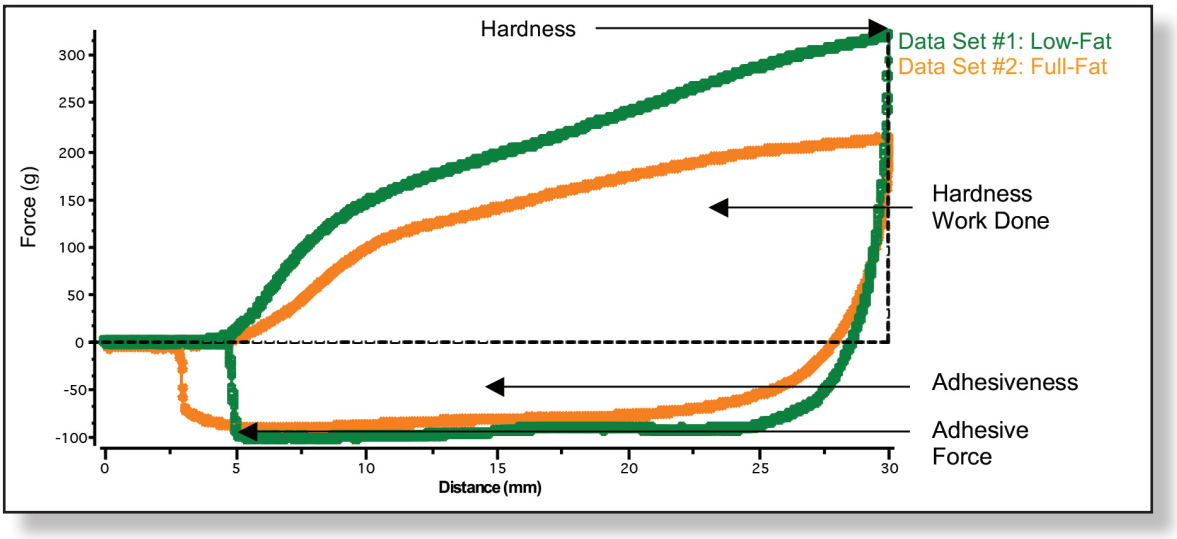


Figure II

Figure II shows force vs. distance for the extrusion of full-fat and low-fat Crème Fraiche. The maximum peak on the graph at the target distance of 30 mm is a measure of sample hardness. The area under the positive peak from the start of the test to the target distance (30 mm) is a measure of hardness work done. The maximum negative peak is a measure of adhesive force. The area above the negative peak is a measure of sample adhesiveness.

## OBSERVATIONS

When a trigger force of 10 g has been attained at the sample surface, the extrusion plunger compresses the sample over a specified distance of 30 mm. During this time, the sample is deformed and compressed to pack more tightly into the remaining space available (under the descending plunger). When the sample becomes very compact with limited air pockets, the force rapidly increases and the extrusion commences. Once the specified distance has been reached, the plunger begins to withdraw from the sample.

The maximum force on the graph is a measure of sample firmness over the specified distance; the higher the value, the firmer the sample. The area under the curve is a measure of sample consistency; the higher the value, the thicker the consistency of the sample. As the probe withdraws from the sample, the initial lifting of the weight of the sample on the surface of the plunger produces the negative part of the graph. The maximum negative force is a measure of sample adhesive force; the more negative the value, the more adhesive the sample. The area under the negative curve is a measure of sample adhesiveness. From the graph, Low-fat Crème Fraiche requires a higher force of compression than full-fat Crème Fraiche.

The following table summarizes hardness and work done, adhesiveness and work done.

| Créme Fraiche | Hardness (g) | Hardness Work Done (mJ) | Adhesive Force (g) | Adhesiveness (mJ) |
|---|---|---|---|---|
| Low-Fat | 322 | 51.3 | 101 | 20.7 |
| Full-Fat | 216 | 35.9 | 90 | 17.8 |