
Production: CHEESE

Objective: Assessment of the extensibility (stretch quality) of two types of melted cheese

Type of action: Tension test

Test mode setting:

Speed	Test mode	Trigger	Target	Hold
10 mm/s	Distance (t)	0 gf	270 mm	0 sec

Accessory:

Cheese string rig

Sample Preparation:

With the arm of the texture analyzer raised well above the base of the instrument position the slotted base plate onto the instrument and fasten the thumb screws to loosely secure. Using the M6 bolt provided screw the fork connector into the load cell and hang on the fork. Slide the empty sample pot with cheese retainer insert into the slotted base plate and bring the instrument arm downwards. Adjust the base plate to ensure central location of the fork on the fork connector. Tightly fasten the thumb screws to secure the fixture base.

Slide the empty sample pot forwards to approximately 2cm from its back plate stopping position. Calibration of the position of the fork connector is now required so that the starting point of each test remains the same. This can simply be performed by touching the fork connector onto the edge of the sample pot.

Move the fork connector down until it is just above the edge of the sample pot arrangement. Click on Calibrate Height and set return distance to 10mm, return speed to 10mm/sec and contact force to 100g. Click Ok to run the height calibration. It is recommended that this position is then recorded as a Stored Probe Position.

The next step is to Tare the weight of the fork from the tests so that it is not included as part of the measurement. Remove the sample pot from the instrument and hang the fork on the fork connector. Tare to tare off the weight of the fork.

Test Set-Up:

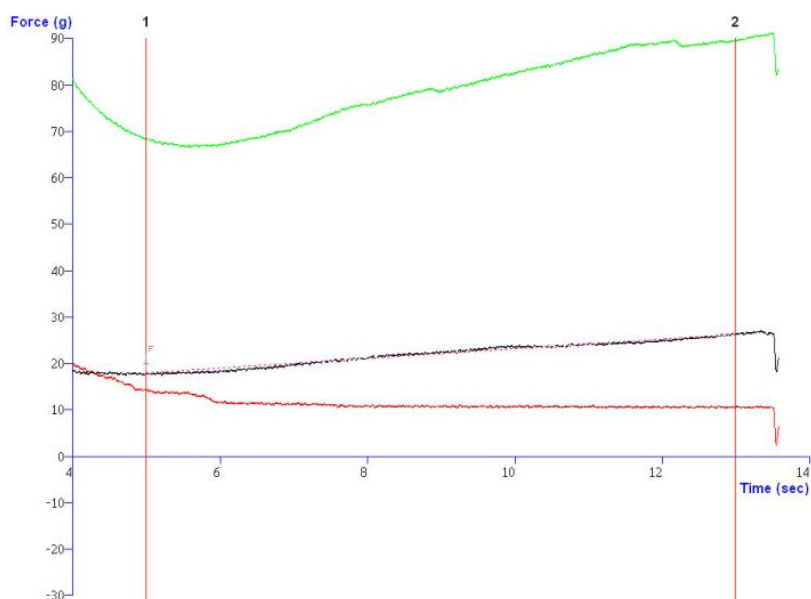
Remove the cheese from the refrigerator just before testing and cut into small cubes; e.g. five samples of 60 g for each cheese and return to the refrigerator until required.

Remove the cheese retainer insert from the sample pot and position the fork centrally in the recess of the sample pot cavity. Fill with small cheese cubes evenly around the fork without relocating the fork within the pot. Microwave the sample pot, fork and cheese for a suitable time on a suitable power setting. (These chosen sample preparation settings should be used for all subsequent sample preparations.)

Once the cheese is melted, push the cheese retainer insert firmly into the sample pot. Push the sample pot assembly carefully into the slotted base and insert the PT100 probe into the cheese. Once the temperature reaches 55C the test will commence.

To facilitate easy cleaning it is recommended that the cheese retainer insert is immediately removed from the sample pot. Slide the sample pot assembly to the front of the slotted base and clear of the instrument arm, firmly pull the cheese retainer insert up using the ring on the top side of the insert. Now, leave the fork and cheese sample in the sample pot for between 5-10 minutes before removing the cheese. This time period allows the cheese to partially solidify and allows easy removal of the cheese from the fork and pot.

Wash the fork, sample pot and cheese retainer insert in hot soapy water with a soft plastic bristled brush. Rinse thoroughly with clean water and allow to dry before next use.

Typical plots:

Typical Texture Plots of three types of cheese (zoomed to region of interest)

Observations:

Once the target temperature has been reached the instrument will move at the test speed of 10 mm/s. The fork probe is moved to the target distance of 270 mm. The initial force peak is largely created by suction of the fork to the sample pot base and is therefore not included in the analysis of the curve. The fork then continues to be pulled from the cheese mass and the force is measured as the cheese strands are stretching across the gap between the fork and molten cheese pool. Once the target distance is reached the probe returns at 10 mm/s to the start position.

The force at 10s is taken as the resistance to extension and indicates the toughness of the cheese. The tougher the cheese the higher is this force value. From this point onwards to 26s the gradient of the slope is taken. For a cheese which does not display a stretching property this gradient will be negative - i.e. as the fork pulls out of the cheese mass the weight of the cheese hanging on the fork will decrease as distance increases. For a cheese which resists withdrawal of the fork from the cheese mass and in fact becomes more solid as it is drawn from the molten cheese mass this gradient increases. The greater the gradient over this region the tougher is the stretching quality.

Data Analysis:

☒ Cursor Mark (Find 10 second)

☒ Cursor Mark (Find 26 second)

Results

Sample	Force at 5s (Resistance to Extension/Toughness) (g) (+/- SD)	Gradient of Stretch region (Stretch quality) (g/s) (+/- SD)
Mature Cheddar	13.7 +/- 0.5	-0.4 +/- 0.06
Mozzarella Low Fat	14.5 +/- 2.6	1.0 +/- 0.06
Mozzarella Full Fat	59.6 +/- 2.9	3.7 +/- 0.6

Notes:

- The method used in this report could be extended to other cheese types or cheese products. An increased test distance may be required for more extensible cheeses or if breaking of the cheese strands is required then an extended height instrument may be needed.