Yogurt and Mouth Feel

Quality control testing of any food product using texture analysis (see Figure 1) requires a consistent test method that has been empiricially refined to suit the product of interest and the equipment available. An additional requirement is that the test be simple, quick to perform and repeatable. These seem like tall demands for today's busy, cost conscious production environment. The following describes one scenario in which these guidelines were followed easily and quickly.

Figure 1: Brookfield CT3 Texture Analyzer

One luxury dessert manufacturer, who makes yogurts, has three production lines each producing similar but slightly different products. Mouth-feel was believed to be the distinguishing characteristic separating these desserts from their competitors. Sensory testing of mouth-feel involves drawing the product over the tongue. This is the quality they wished to guarantee.

Figure 2: Back Extrusion Fixture Used to Test Yogurt for Mouth Feel Quality

A back extrusion test using a Texture Analyzer can best simulate the mouth-feel process. The nice feature of the back extrusion test is that the product may be tested in the retail container. Alternatively, there are special accessory fixtures available for use with texture analyzers to accomplish the back extrusion test. A sample that is about to undergo a typical back extrusion test is show in Figure 2.

The probe which tests the yogurt is somewhat smaller in diameter than the container. As the probe travels downward at a constant speed, the product is forced back up between the side of the container and the edge of the probe in a process known as back extrusion. During a back extrusion test the texture analyzer measures an increasing load force as the product slides past the edge of the probe. After the probe is fully wetted with the product, the load force normally stops increasing and shows a smooth, constant load force during the remainder of the downward travel. The graph in Figure 3 shows data from the three dessert products that were evaluated under identical test conditions.

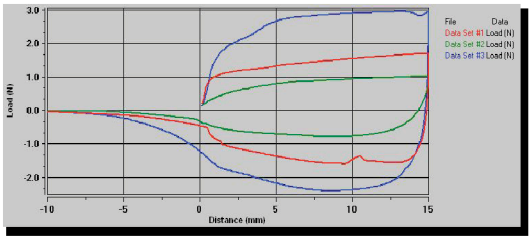

Figure 3: Test Data for 3 Yogurt Samples Using the Back Extrusion Method

Zero on the x-axis identifies the surface of the sample as the probe makes contact. From that point the probe descends 15mm, then retracts back to the starting position. The negative load force values indicate the resistance imparted by the products as the probe returns to its initial position. Notice that the negative load extends to the left of x-axis zero. This is a result of the product sticking to the probe, forming a peak until it breaks free from the probe.

The green curve represents the softest of the three yogurts that were tested. The lack of a steep slope at the beginning of the test reveals very little yield stress and the low load force indicates a product of low viscosity that is easily drawn over the tongue. The red curve has a short, steep slope at the beginning of the test. This means that the yogurt exhibits greater stiffness. It is able to form peaks when spooned and yet is smoothly drawn over the tongue, although more force is required to do so. The blue curve shows that this yogurt exhibits a stiffness that is similar to the previous product, but requires a noticeably greater force to draw it over the tongue. This means that it probably has a much higher viscosity. Although texture analyzers don't measure viscosity directly, the physical properties they do

measure can often be correlated to viscosity.

The back extrusion test is easy to perform, does not require a lot of time per test, and measures physical properties of the yogurt directly related to mouth-feel. Method development is a simple matter of empirically determining the proper probe size and optimal test speed for conducting a quick and meaningful QC check. Depth of probe penetration is another detail that needs to be resolved; the approach is to make sure that the load force value has stabilized.

The Texture Analyzer is a tool gaining in popularity with the food industry because of its versatility in providing objective data for the all important mouth-feel criterion.

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