

The usefulness of the extrusion technique as a quantitative measure of differentiating dysphagia-oriented meals based on particle size disparities.

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The particle size is the key consideration when designing International Dysphagia Diet Standardization Initiative (IDDSI) Levels 4 and 5 meals. The particle size requirement for IDDSI Level 5 is 4mm × 15mm to ensure swallowing safety and to provide distinct texture. Currently, the particle size is routinely evaluated through the slot between fork prongs. The gap between the prongs of a standard dinner fork measures 4mm, while the length of four prongs is about 15mm, which provides the rationale for using a fork to measure the particle size. IDDSI test methods provide useful clinical compliance checks for particle size and work well in smaller kitchens. However, they are slow and difficult to use in a commercial setting where quality checking of massive production would be challenging. Moreover, Fork measurements do not provide precise quantitative comparisons across products. Product comparison is crucial during product development to achieve more accurate and consistent outcomes. Therefore, the purpose of the current study was to develop an in-plant technique that can distinguish products based on particle size differences. We developed the technique – "Extrusion" to see if this technique could differentiate products based on particle size differences. The hypothesis is that the force needed to extrude the sample would reflect the food particle size. Extrusion test results were compared with the IDDSI particle size and sieve test measurements to find if they produced compatible results. The extrusion test generated unique force-displacement graphs for each product that distinguishes one product from another based on the particle size disparities. Each graph provided quantitative information about particle size by visually representing them as peaks with different magnitudes on a force-displacement graph. The average extrusion force and the average force fluctuation from the mean force were statistically significantly different ($p < 0.05$) between IDDSI Levels 4 and 5. Results were also compatible with the IDDSI test and sieve test results. Therefore, the author would like to propose this technique as a reliable in-plant quality control tool that provides useful guidelines for texture-modified food manufacturers to differentiate their products based on particle size disparities.