Ultrasonic waves claimed to boost sponge cake quality  02 May 2011

Bakeryandsnacks.com (2/5/2011) has reported on a study by Malaysian food engineers, which has been published in the Journal of Food Engineering showing the effect of ultrasonic waves on sponge cake quality. The researchers showed that ultrasound exposure could be used to improve the quality of aerated food products given that their research results showed it produced cake batter of lower density and flow behaviour index, as well as having higher viscosity, overrun, and consistency.

Breads, sponges and biscuit owe their distinctive appeal to their aerated structure, so the aim of this study was to investigate the potential use of power ultrasonic in improving this essential attribute. As the formation of air cells during mixing is known to be important to a cake’s texture, the effect of application of ultrasonic waves during the batter mixing stage was studied in terms of batter and sponge cake quality.

Previously, power ultrasound has been used to reduce total fermentation time of yoghurt after inoculation, to shorten the ice cream freezing process time and to reduce the drying time of orange peel. In addition the technique has also been used to minimise flavour loss, induce greater homogeneity and to generate significant energy savings during heat pasteurization of sweet juices.

For this study, Sponge cake batter was prepared from commercial low protein whole flour, emulsifier, corn starch sugar, baking powder, salt and fresh whole eggs and mixed using the “all-in” method. All the ingredients were initially mixed for two minutes at 80 rpm and then additional nine minutes at 90 rpm in a mixer bowl. The bowl was then placed in an ultrasound bath system with adjustable power of 1 kW, 1.5 kW or 2.5 kW for varying lengths of time from 3 to 9 minutes.

The researchers found that the effect of ultrasound exposure on batter and cake properties were more “prominently positive when mixed at 2.5 kW for the entire mixing duration of 9 minutes while detrimental effects were found when 1.5 kW was used for 6 min.” Ultrasound treatment seemed to assist with increasing the overrun or aeration in cake batter during mixing when used for longer durations and at the highest power level of 2.5 kW. The ultrasound duration rather than the ultrasound power was more effective in creating changes and giving effects to the cake batter properties.

Aerated batter density exposed to three minutes of ultrasound at all power levels, 1 kW, 1.5 kW and 2.5 kW showed little difference with the control. An overall evaluation of textural properties of cakes made from batter mixed at 2.5 kW for 9 min of ultrasound exposure showed that it possessed hardness which was 12 per cent lower than the control, and 10 per cent lower in both gumminess and chewiness, while the cake springiness, cohesiveness and resilience were slightly higher than [the] control.

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