

Acceleration of Fat Crystal Network Formation by Use of High Intensity Ultrasound

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The aim of the present study was to evaluate the effects of high intensity ultrasound (HIU) on the crystallization and melting behaviour of anhydrous milk fat (AMF). An ultrasonic processor with an operating frequency of 24 kHz providing a maximum power output of 200W was applied at different crystallization temperatures ranging from 22-30°C.

Changes in crystallization and melting behavior were studied by use of differential scanning calorimetry (DSC). Applying HIU for 5 seconds was sufficient to alter the crystallization behaviour of AMF. HIU reduced induction time for crystallization and led to changes in the fractionation pattern of the low- and high melting fractions of AMF.

The development of solid fat content was examined by low-field NMR. These results further support the observation of accelerated crystallization, and an increase in solid fat content is observed in response to HIU.

Preliminary studies on the stability of HIU-induced changes show that the melting profile of untreated AMF changed after storage for 7 or 14 days. For AMF subjected to HIU, the melting profile remains unchanged, indicating that a more stable crystal network is developed when HIU is applied.