

Effect of ultrasound on fermentation kinetics and quality of buffalo yogurt

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Milk fermentation is a slow and expensive process, requiring the maintenance of milk for a long period at 43°C for bacterial growth. Yogurt defects, such as gel breakage and syneresis, may limit the product shelf life. Ultrasound (US) can be used to overcome these barriers, due the potential of this technology to improve the fermentation and quality of fermented products. Thus, this study aimed to evaluate the effect of US on the fermentation parameters of buffalo milk and on the characteristics of the yogurt obtained after 1 and 21 days of storage. Milk (with or without 5% sugar) was fermented partially (1, 2, or 3h) or fully (7h) under US (25 kHz, with 38W/L volumetric power) and then stored for 21 days at 7°C. The results showed that US-assisted fermentation was effective in accelerating the fermentation rate (up to 41% increase), reducing the fermentation time (up to 2 hours), as well as improving the quality attributes of buffalo yogurt when compared to conventional fermentation. The samples produced by US-assisted fermentation, with or without sugar, did not show differences in pH, acidity, and lactic acid bacteria viability when compared to the control sample ($p>0.05$); however, those fermented for 1h and 2h under US had increases in water holding capacity (up to 35%), consistency index (up to 81.1%), and apparent viscosity (up to 69.4% with a shear rate at 10s⁻¹) ($p<0.05$), resulting in more consistent gels, as evidenced by microscopy images. On the other hand, samples subjected to long US-assisted fermentation (? 3h) had a more fragile structure, with a consistence index and apparent viscosity similar (3h of US) or lower (full fermentation under US) than the control sample ($p<0.05$), also impacting the water holding capacity. Finally, the addition of sucrose contributed positively to the quality attributes of the yogurt, allowing the formation of a gel with a more compact protein network. Based on these results, we concluded that partially US-assisted fermentation can be an interesting strategy to accelerate the process and improve the quality of buffalo yogurt.