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Effect of sodium alginate addition on properties of low fat cheddar cheese

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Four different concentrations of sodium alginate (alginate) were used to prepare low fat cheese (LFC) with a fat and energy value reduction up to 91% and 55%, respectively. The varying levels of alginate added in LFCs were 0.12 (LFCA1), 0.17 (LFCA2), 0.18 (LFCA3) and 0.23% (w/w) (LFCA4). Control full fat cheese (CFFC) and control low fat cheese (CLFC) were used for the comparison. Physical characteristics, namely texture profile analysis (TPA), microstructure and color were analysed throughout ripening period until 180 days. All cheese samples were examined for physical, chemical and biochemical properties such as composition, yield, texture and proteolysis. The yield of the cheeses ($P<0.05$) was directly proportional to the fat and alginate level in milk, whereas the moisture and total protein were inversely proportional to the fat content ($P<0.05$). The results of primary proteolysis (except pH 4.6 soluble nitrogen) showed that alginate added LFCs demonstrated higher level of proteolysis compared to CLFC and CFFC, whereas arginine was found in highest level in alginate added LFCs. Concentrations of volatile compounds also varied with cheese treatment. TPA illustrated a significant improvement in texture of alginate added LFC ($P<0.05$) compared to CLFC. The textural attributes of LFCA1 ripened for 30 days were comparable to CFFC ripened for 60 days and beyond. Scanning electron micrograph images revealed that alginate added LFCs had smoother surfaces as compared to CFFC and CLFC. Confocal laser scanning microscopy suggested significant ($P<0.05$) increase in fat globule's size, area and volume in CFFC as compared to LFCs during ripening. Hunter *L, a* and *b* values for alginate added LFCs indicated that they were whiter than CLFC and less yellowish than CFFC. Addition of alginate significantly improved the textural and microstructural properties of LFCs, affirming its potential as a promising fat replacer.

Biography

Bal Kumari Sharma Khanal is a PhD student at the University of Queensland, Australia undertaking a research on low fat Cheddar cheese. Now, she is in her final year of PhD. The main disadvantage of low fat cheese is that when the fat is removed, its textural, functional and sensory properties are adversely affected. To minimize these negative effects, she has prepared low fat Cheddar cheese by different approaches including use of sodium alginate as a fat replacer. She has found that the textural and biochemical properties of alginate added low fat Cheddar cheese are closer to its full fat counterpart, suggesting that the sodium alginate could be a potential fat replacer to prepare low fat Cheddar cheese.

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