Optimization of textural properties and formulation of reduced fat Cheddar cheeses containing fat replacers.

ABSTRACT

Cheese is becoming one of the most widely utilized food ingredients. Raised awareness of people on healthy lifestyle has led to an increased demand for low-calorie foods, particularly for low and reduced fat cheeses. Although low and reduced fat cheese exhibits poor texture and body compared to full fat ones, consumers expect to have all the characteristics of full-fat cheese in its low and reduced fat counterpart. Reduction of fat content significantly increased hardness, gumminess, springiness and chewiness of the cheeses. Fat replacers are ingredients intended to be used instead of the fats and they have less caloric value and provide functional properties of the fat to foods. The main objective of this study was to optimize the low and reduced fat Cheddar cheese formulation by using protein- and carbohydrate-based fat mimetics. A full factorial design used to determine the most suitable amounts of fat mimetics (xanthan gum and sodium caseinate) with the objective of obtaining reduced fat Cheddar cheese with satisfactory yield and texture profiles. The results indicated that the type and concentration of fat mimetics significantly ($p < 0.05$) affected the textural properties of reduced fat Cheddar cheese. The results obtained by multiple optimizations revealed that the reduced fat Cheddar cheese containing 0.045% (w/ w) xanthan gum, 0.000% (w/w) sodium caseinate and 2.000% (w/w) fat provided the high textural desirability (0.90065%). This study revealed that the low and reduced fat Cheddar cheese produced with xanthan gum as a carbohydrate-based fat mimetics simulated the functions of fat better than sodium caseinate as a protein-based fat mimetics.

Keyword: Cheddar cheese; Low fat; Reduced fat; Fat replacer; Fat mimetic; Xanthan gum; Sodium caseinate; Full factorial; Optimization; Surface plot; Textural Profile Analysis (TPA).