Dynamics of proteolysis and lipolysis of whole UHT milk during the storage period

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Short title: **UHT milk proteolysis and lipolysis during shelf-life**

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Summary

This Regional Research Communication describes the relationship between the characteristics of the whole UHT milk throughout its shelf-life period of 120 days and the hydrolysis of protein and lipids contents. Ten sets of samples were evaluated respectively from batches of UHT milk produced in 10 different days in a dairy processor in Parana State, Brazil. Each set was constituted by 1 litre of raw milk, one of pasteurized milk, and 12 units of 1-litre cartons of UHT milk. Total mesophilic (TMBC) (32°C/48hs) and psychrotrophic (TPBC) (7°C/10 days) were assessed by standard agar plate count. Somatic cell counts (SCC) were assessed by flow cytometry. Physicochemical characteristics assessed were titratable acidity, pH, freezing point, fat, density, total solids (ST), solids non-fat (SNF), ethanol stability (80°GL), concentration of sialic acid, crude protein (CP), casein and free fatty acids (FFA). Proteolysis and lipolysis were determined from UHT milk samples. TMBC ranged from 3.5×10^6 to 3.1×10^7 CFU/mL and TPBC from 10^6 UFC/mL and higher. SCC were between 18×10^4 SC/mL to 4.83×10^5 CS/mL. Casein concentration decreased by 21% from T_0 to T_{120}. A positive and significant correlation in pasteurized milk was observed between proteolysis and TPBC (r= 0.799), and proteolysis and SCC (r= 0.972). A negative and significant correlation with UHT milk storage time and proteolysis was evidenced ($R^2 = 0.976$), and a total breakdown of casein estimated for its 560th day. Correlation of lipolysis and SCC in raw milk was positive and significant (r = 0.837), but this trend was not observed among UHT samples. Concentrations of FFA and storage time of UHT milk were significantly correlated ($R^2 = 0.924$), but without differences between averages. Changes were evidenced in acidity, pH, density, ST and SNF. Increasing of FFA concentration of UHT milk over time and raw milk quality plays importantly towards the shortening of UHT shelf-life, although age gelation and sedimentation were not observed.