Application of osmometry in quality analysis of milk

Colin Musara & William Pote

Abstract

The aim of this study was to evaluate osmometry as a tool in quality analysis of milk. The osmolality of raw milk, sterilized milk, skimmed UHT (ultra-high temperaturetreated) milk, pasteurized milk, standardized UHT milk and fermented milk (Lactococcus lactis culture) was determined by freezing point osmometry. The relationship between osmolality and pH of fermented milk was further investigated during spontaneous fermentation of UHT milk at 37 °C for 48 h. Average osmolality values (mean ± SD) were raw milk- 290.2±7.98, sterilized milk-290.2±5.84, skimmed UHT milk-290.8±3.31, pasteurized milk-283.6±2.28, standardized UHT milk-281±4.59 and fermented milk-466.0±17.30 mOsmoles kg−1. For fresh milk samples, 88 % showed normal osmolality, 8 % were hypo-osmotic and 4 % hyper-osmotic. Fermentation studies revealed a high negative correlation between osmolality and pH, with a correlation coefficient of −97.49 %. Hypo-osmotic milk shows mixing of milk with water along the production chain. Hyper-osmotic milk indicates fermentation of milk at high ambient temperatures or with prolonged storage. It may also reveal adulteration of fresh milk with a soluble substance. Osmolality was highest for fermented milk owing to production of lactic acid during fermentation. This was confirmed by the high negative correlation between osmolality and pH of milk in fermentation studies. Hence the osmolality of fermented milks may be used as an index of the extent of fermentation.