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Transition in Protein Profile, Maillard Reaction Products and Lipid Oxidation of Flavored Ultra High Temperature Treated Milk

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Abstract : - Thermal processing and subsequent storage of ultra-heat treated (UHT) milk leads to alteration in protein profile, Maillard reaction and lipid oxidation. Concentration of carbohydrates in normal and flavored version of UHT milk is considerably different. Transition in protein profile, Maillard reaction and lipid oxidation in UHT flavored milk was determined for 90 days at ambient conditions and analyzed at 0, 45 and 90 days of storage. Protein profile, hydroxymethyl furfural, furosine, Nε-carboxymethyl-l-lysine, fatty acid profile, free fatty acids, peroxide value and sensory characteristics were determined. After 90 days of storage, fat, protein, total solids contents and pH were significantly less than the initial values determined at 0 day. As compared to protein profile normal UHT milk, more pronounced changes were recorded in different fractions of protein in UHT milk at 45 and 90 days of storage. Tyrosine content of flavored UHT milk at 0, 45 and 90 days of storage were 3.5, 6.9 and 15.2 µg tyrosine/ml. After 45 days of storage, the decline in αs1-casein, αs2-casein, β-casein, κ-casein, β-lactoglobulin, α-lactalbumin, immunoglobulin and bovine serum albumin were 3.35%, 10.5%, 7.89%, 18.8%, 53.6%, 20.1%, 26.9 and 37.5%. After 90 days of storage, the decline in αs1-casein, αs2-casein, β-casein, κ-casein, β-lactoglobulin, α-lactalbumin, immunoglobulin and bovine serum albumin were 11.2%, 34.8%, 14.3%, 33.9%, 56.9%, 24.8%, 36.5% and 43.1%. Hydroxy methyl furfural content of UHT milk at 0, 45 and 90 days of storage were 1.56, 4.18 and 7.61 (µmol/L). Furosine content of flavored UHT milk at 0, 45 and 90 days of storage intervals were 278, 392 and 561 mg/100g protein. Nε-carboxymethyl-l-lysine content of UHT flavored milk at 0, 45 and 90 days of storage were 67, 135 and 343mg/kg protein. After 90 days of storage of flavored UHT milk, the loss of unsaturated fatty acids 45.7% from the initial values. At 0, 45 and 90 days of storage, free fatty acids of flavored UHT milk were 0.08%, 0.11% and 0.16% ($p<0.05$). Peroxide value of flavored UHT milk at 0, 45 and 90 days of storage was 0.22, 0.65 and 2.88 ($MeqO^2/kg$). Sensory analysis of flavored UHT milk after 90 days indicated that appearance, flavor and mouth feel score significantly decreased from the initial values recorded at 0 day. Findings of this investigation evidenced that in flavored UHT milk more pronounced changes take place in protein profile, Maillard reaction products and lipid oxidation as compared to normal UHT milk.

Keywords : UHT flavored milk , hydroxymethyl furfural, lipid oxidation, sensory properties
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