ABSTRACT

Title : Preparation of mozzarella cheese with selective starter cultures

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A study was conducted to prepare Low moisture part skim (LMPS) mozzarella cheese using various starter culture combinations by three different techniques, viz., stretched, unstretched and no brine curd. The selected cultures were combined based on their galactose fermentation pattern into 12 culture combinations. Lactic acid bacteria selected for the present study were gal+ and gal- strains each of Lactobacillus delbrueckii ssp. bulgaricus and Streptococcus salivarius ssp. thermophilus, gal+ strains of Lactobacillus helveticus and Lactococcus lactis ssp. lactis.

Among the three techniques, no brine curd had shown a higher fat and total solids recovery in mozzarella cheese. The culture strain did not affect the composition of mozzarella cheese in all of the 12 culture combinations.
Lactococci count was markedly high when compared to lactobacilli count during storage of mozzarella cheese prepared by three techniques. During storage of mozzarella cheese up to 7 days, rods and cocci showed no significant reduction in the count.

Extent and depth of proteolysis as measured by pH 4.6 and 12 per cent TCA soluble nitrogen were found to be higher in mozzarella cheese prepared with culture combinations consisting of \textit{L. delbrueckii} ssp. \textit{bulgaricus} as one of the culture pair whereas the culture combination comprising of \textit{L. helveticus} as one of the culture pair exhibited moderate level of proteolysis in mozzarella cheese.

The initial residual lactose level in mozzarella cheese was higher in stretched curd followed by no brine and unstretched curd in descending order. The initial accumulated galactose concentration was lower in unstretched curd followed by no brine and stretched curd in ascending order. Amongst the culture combinations, C₈ and C₉ comprised of gal⁺ strains of \textit{L. helveticus} and \textit{S. salivarius} ssp. \textit{thermophilus} reduced the galactose level significantly (P < 0.01) during storage upto 7 days. Gal⁺ strains of \textit{S. salivarius} ssp. \textit{thermophilus} when combined with gal⁺ strain of \textit{L. delbrueckii} ssp. \textit{bulgaricus} did not show any significant difference in the galactose concentration.

The level of proteolysis was lower in no brine curd. During storage, pH 4.6 soluble nitrogen content progressively built-up, which showed significant difference (P < 0.01) wherein 12 per cent TCA SN increase was insignificant.
Functional properties viz., stretchability, meltability and free oil content were optimal for the mozzarella cheese prepared by no brine curd, followed by unstretched and stretched curd.

Sensory evaluation revealed that flavor score was maximum for no brine curd. Hunterlab L* value as an index of browning of LMPS mozzarella cheese prepared with gal* strains of *L. helveticus* and *S. salivarius* ssp. *thermophilus* had shown significant reduction (P < 0.01) from control 0 day to 7 days of storage in no brine curd, which indicated that the cheese had assumed low browning status while exposed to high temperature of baking. Sensory evaluation for browning scores could be very well correlated with the browning index.

The preservatives sorbic acid at 0.05 per cent and pimarin at 0.10 per cent concentration extended the shelf-life of no brine LMPS mozzarella cheese favorably. Vacuum and PVDC film packaging prolonged shelf-life of LMPS mozzarella cheese upto 21 days of storage under observation at 8°C.