Selecting Low Cost Freeze Dried Culture for Curd to Replace Existing Starter Culture

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Introduction

Curd is a thick, sour, well known fermented milk product having close resemblance to yoghurt. It has a distinct taste, richness and delicacy. It is not only refreshing and delicious but nutritious, healthy and easily digestible. Curd is an integral part of Indian diet and possesses therapeutic and dietetic properties (Gupta and Prasad, 2000). Curd is also known as probiotic or functional food as it possesses live lactic acid bacteria. Benefits of consuming curd are; enhanced immune response, balancing of fecal enzymes and intestinal micro flora, prevention of cancer, antibiotic therapy, reduction of serum cholesterol and risk of coronary heart diseases, antagonism against food borne pathogen, tooth decay organism and anti-tumor activity (Pattnaik and Mohapatra, 2000).

Bacterial cultures, known as starters are used in manufacturing of curd, yoghurt, kefir and other cultured milk. The starter is added to the product and allowed to grow there under controlled conditions. During fermentation, bacteria produce substances which give the cultured product its characteristic properties such as acidity, flavour, aroma and consistency. Drop in pH, which takes place when the bacteria fermenting lactose to lactic acid, has a preservative effect on the product, while at the same time the nutritional value and digestibility are improved (Rubiga Sivapatham, 2001).

Dairy starter cultures are carefully selected microorganisms, which are deliberately added to milk to initiate and carry out desired fermentation under controlled conditions. Most of them belong to lactic acid bacteria (*Lactococcus, Lactobacillus, Streptococcus* and *Leuconostocs*).The different starter used in the manufacture of curd includes *Lactococcus. lactis, L. cremoris, Streptococcus thermophilus, Lactobacillus bulgaricus, L. plantarum* and lactose fermenting yeasts. The main objective of this study was to select a most cost optimized starter culture to replace the existing composite starter cultures, without changing its organoleptic properties.

Methodology

Curds were prepared according to the standard procedure (SLS part 2:1989). Two starter cultures were used (A and B) which were lower in cost than the existing starter culture. Organoleptic characteristics of curds prepared with A and B were compared with the curd prepared with existing starter culture (C). "A" included *Streptococcus thermophilus, Lactobacillus delbrueckii* subsp*. Bulgaricus* and *Bifidobacterium* species and culture type "B" included *Streptococcus thermophilus, Lactobacillus delbrueckii* subsp. *Bulgaricus* and *Streptococus lactis* subsp. *lactis* biova *diacetylactis*. Completely Randomized Design (CRD) comprising three treatments with four replicates was used as the experimental design. Parametric data analysis was done using ANOVA for significance under $\alpha = 0.05$ level using MINITAB 15 statistical software package. Non parametric data analysis was done by Friedman non-parametric test using MINITAB 15 statistical software package. The sensory evaluation was carried out with seven trained panelists and 23 untrained panelists using nine point hedonic scale to assess sensory attributes of appearance, flavour, texture, mouth feel and overall acceptability.

Shelf life of the curd prepared was determined by analyzing titratable acidity, pH, yeasts and moulds, coliforms at five days intervals for 35 days and compared with the control.

Results and Discussion

According to the figure 1 there was no significant difference between sensory attributes of appearance, flavour, texture, mouth feel and overall acceptability of "A", "B" with the control ($P>0.05$). However, curd prepared with culture type "A" was rejected due to prolong setting time compared to control. Culture type "B" was selected as the most cost optimized starter culture which gives similar properties and used for further analysis.

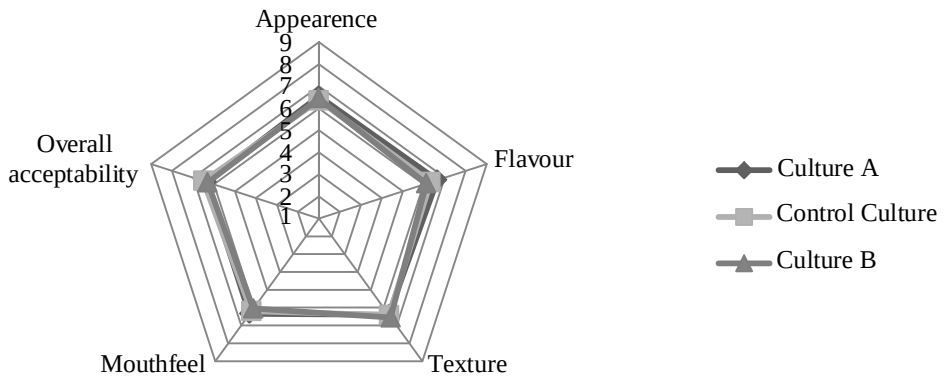

Figure 1. Variation in sensory attributes of curd prepared with different starter cultures

Organoleptic characteristics and incubation time of "B" were similar to the control. Culture "B" reduced the cost of curd by 6 cents per curd than the control and it can be stored at 4 $^{\circ}$C up to 35 days. Coliform count was zero in all curd samples during 35 days of shelf life period. This may be due to minimum level of contaminations due to strict hygienic practices and addition of preservatives to the curds. There was no growth of yeast and mould and this may be due to the addition of preservatives to the curd mix and pasteurization of curd mix.

There was no significant difference ($p>0.05$) of pH among three curd samples during incubation and refrigerated storage period (Figure 2). The titratable acidity of curd prepared with culture "B" was within the acceptable range of 0.9-1.2% (w/w) lactic acid and it complied with the Sri Lanka Standard specifications for curd. Results revealed that total coliform, yeast and mould counts, pH and titratable acidity of curd prepared with "B" were in conformity to the Sri Lanka Standards. The cost of curd was reduced by 6 cents per 480 g curd tub due to the usage of new starter culture and it reduced the cost of production of curd by Rs. 30,240.00 per month.

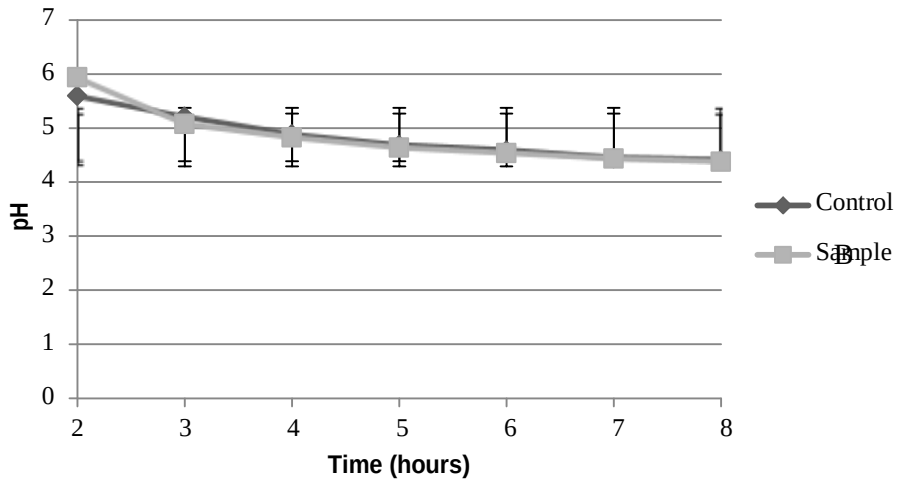

Figure 2. Changes of pH during incubation of curd

Conclusion

It can be concluded that the starter culture "B" can be used to replace the existing composite curd culture without changing organoleptic properties. pH and titratable acidity of the curd prepared with "B" are within the prescribed standards for curd and it showed a storage life of 35 days at 4 ºC.

References

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