Studies on preparation of smart curd

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In India, curd forms one of the essential item and efficient source of probiotics supplement. Probiotics are a group of beneficial lactic acid producing bacteria which constitute the major portion of the gut micro floral population providing invaluable B-complex vitamins. However, the beneficial effects of these probiotics depend on their nutrient availability, especially prebiotics. Prebiotics are non-digestible food ingredients that target selected groups and selectively enhances the growth of probiotics (DiRienzo, 2000). In the present study, the prebiotic potential of commercially available Fructo-oligosaccharide (FOS) targeting, *Bifidobacterium spp.* and *Lactobacillus spp.* was utilized to prepare smart curd and the same was examined for chemical, microbiological, sensory evaluation and compared with control curd.

The curd was prepared by addition of different levels of FOS as a prebiotic and sensory evaluation was carried out. The physical and chemical properties were also estimated. Fresh cow milk was procured and pasteurized at the temperature of 95°C for 15 min, then cooled to 40°C. FOS was incorporated at various levels such as 0.5%, 1%, 1.5% and the mesophilic culture inoculated at 2% level. The mix was transferred to the cups and incubated at 37°C for 4 hours, then stored at refrigerated temperature (4°C). The sensory qualities like pH, acidity, fat, proteins and total solids were estimated at different period of time interval. Microbiological properties like total count, coliform count, yeast and mould count were also assessed. The sensory evaluation was also carried out with different parameters like appearance, sourness, flavour and overall acceptability. The chemical, microbiological and sensory evaluation of smart curd was carried out and the same was compared with control curd (without addition of FOS).

The chemical composition of the smart curd and control curd is presented in table 1. The pH and titrable acidity was found to increase with the increased addition of FOS to the curd. From the present study, it was observed that FOS did not affect the fat percentage of the product. The present findings were in agreement with findings of Guven *et a1.* (2005) who found that the use of inulin as a fat replacer did not significantly affect the pH values. Similarly, Barrantes *et al.* (1994) reported that fat replacers did not negatively change the activity of yogurt starter bacteria.

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Table 1. Chemical composition of the smart curd

Variables	Control curd	Smart curd	F values
pH	4.20	4.30	8.00*
Acidity	1.32	1.17	9.65*
Fat	0.326 ± 0.003	0.315 ± 0.006	2.22^{NS}
Protein	3.673^{a} ± 0.017	3.615^{b} ± 0.067	5.51*
Lactose	4.511^{b} ± 0.018	4.648^{a} ± 0.011	36.42**
Total solids	12.570^{b} ± 0.073	13.827^{a} ± 0.086	96.80**

It was observed that the lactose percentage was significantly ($p<0.01$) higher in smart curd group when compared to control curd. The protein and total solids content of the different product showed significant difference between the different products. It was observed that protein content decreased with increase in inclusion of FOS. Tamime and Robinson (1999) also reported that the variation of total solids could be due to increase in the total viable count of these bacteria.

Microbial qualities of the smart curd at different storage period are presented in table 2.

Table 2. Microbial qualities of the smart curd during different storage periods

Microbial qualities (log_{10} cfu/g)	Smart curd			
	0 day	3rd day	7th day	F values
Total count	8.15 ± 0.37	8.43 ± 0.40	8.55 ± 0.30	0.66^{NS}
Coliform count	NIL	NIL	NIL	-
Yeast and mould count	NIL	NIL	1.65 ± 0.27	0.22^{NS}

It was observed that there was no significant difference between treatment groups with respect to total count, coliform count and yeast and mould count during the different storage periods. The increased total count may be due to the enhanced availability of simple sugars mainly glucose, fructose and minerals which act as growth promoters (Analie Lourens Hattingh and Viljoen, 2001). Coliforms were found to be absent in smart curd which indicates that the product was prepared in hygienic condition and the present results were in agreement with the findings of Abou-Donia *et al.* (1991) and Vijayalakshmi *et al.* (2005).

Sensory characteristics of different curds are furnished in Table 3. It was observed that, there were no significant differences between the different types of curd with respect to appearance and flavour scores while significant difference was noticed with respect to sourness and overall acceptability. It was also noted that FOS was not contributing any flavour in general, so there was no significant difference in the product. The sourness of the product was decreased with increase in inclusion level of FOS to the curd, whereas, the overall acceptability increased with increase in inclusion levels of FOS.

Table 3. Sensory evaluation of different treatment of curd (Mean ± SE)

Treatment curd	Appearance	Flavour	Sourness	Overall acceptability
CC	8.16 ± 0.31	8.33 ± 0.21	8.50^{a} ± 0.22	6.83^{b} ± 0.40
SC3	7.33 ± 0.49	7.50 ± 0.43	6.83^{b} ± 0.40	8.83^{a} ± 0.17
F values	0.65^{NS}	0.82^{NS}	3.42I*	6.16**

CC : Control Curd SC3 : Smart Curd3
NS : Non significant * : Significant
** : Highly significant

The cost of production of CC and SC3 were 0.9 and 2.64 rupees respectively. The cost of production of smart curd was higher than the control curd because of the cost of FOS, but this can be offset when compared to the benefits. Hence, from the present study it may be concluded that addition of FOS improves the sensory parameters and did not affect the microbiological parameters and can be deemed safe for consumption.

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