



Technology to conserve sweet cream butter milk

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ABSTRACT: Milk and milk products are one of the important components of the Indian food industry. In recent years there has been wide spread and increasing interest through out the world in creating newer channels of utilization for the by-products of the dairy industry. Conversion of edible substances into non-food items is not ordinarily justifiable especially in countries where there is an overall shortage of milk supplies. It has always been realized that economic disposal of by-products is an essential pre-requisite to profitable dairying. Butter milk, a by product obtained during the production of butter was spray dried with an inlet and outlet temperature of 150°C and 60°C, respectively. The respective mean moisture, total solids, acidity and solubility index of the sprayed dried milk powder was 3.80, 96.27, 0.05, per cent and 2.03 ml. The spray dried sweet cream butter milk powder can be effectively used in preparation of low fat yoghurt and other dairy products such as ice cream, cheese etc.

KEY WORDS : By product, Sweet cream, Butter milk, Spray drying

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INTRODUCTION

At global level, milk has been identified as an integral part of food for centuries. The success of white revolution in India was because of the efforts of millions of small farmers. About 70 million dairy farmers produce more than 50 per cent of the milk in the country. Consumption of milk and milk products is deeply rooted in Indian tradition and it is an essential item during rituals, festivals and other auspicious events. India has diverse food habits, cultures, tradition and religions, which offer great market for milk and milk products. Most of dairy food delicacies are value added products generating high profits. Milk and milk products are one of the important components of Indian food Industry. India is the world's highest milk producer and all set to become the world's largest food factory. Dairy food processing holds immense potential for high returns. The milk production in India is about 109 million tonnes (FAO, 2009). Nearly 50 per cent of milk

produced is utilized for the preparation of dairy products.

In recent years, there has been wide spread and increasing interest throughout the world in creating newer channels of utilization for the by-products of the dairy industry. Conversion of edible substances into non-food items is not ordinarily justifiable especially in countries where there is an overall shortage of milk supplies. It has always been realized that economic disposal of by-products is an essential pre-requisite for profitable dairying. A dairy by-product may be defined as a product produced during the manufacture of a main product. During the processing operations, various by products such as skim milk, whey and butter milk are obtained. Most of the dairy plants in India are confronted with the problem of utilizing these by products in an economic manner. Butter is a traditional natural dairy product, which has been made for centuries from cream. Butter is an emulsion of water in oil and is made in both sweet and sour varieties. Traditionally, butter is produced from matured cream using a discontinuous process. Now-a-days, butter is produced from sweet cream and acidification and aroma formation occurs after the churning process. Sweet butter milk is obtained as a by product during this production process. The sweet butter milk can be used as an ingredient in a wide variety of dairy industry applications.

The dairy plants find it difficult to dispose off the butter milk to drains as it poses pollution threats. Hence, a technology

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to utilize butter milk will be of immense use to the dairy industry. An attempt was made to spray dry the butter milk to enhance the shelf-life and further it can be used in the preparation of low fat yoghurt and other milk products.

MATERIAL AND METHODS

Fresh cow's milk obtained from the local vendor was used to prepare cream. The cream obtained was churned in a butter churn. The sweet cream butter milk obtained as a by product of butter making was used to spray dry. The equipments such as cream separator (Alfa-Laval), Butter churn (Alfa-Laval), Homogenizer (Pasteur Engineering Company Ltd., India) and a Mini spray drier- Buchi 190, Switzerland) were used.

The fresh sweet cream butter milk obtained from churning of cream was analysed for acidity, total solids, fat, protein, and lactose as per the procedure described in IS:SP:18(part XI)-1981. The sweet cream butter milk was concentrated to a powder form by using a mini spray drier-Buchi 190 (Buchi lab Techniques-Switzerland. This operates on the principle of nozzle spraying in parallel flow. *i.e.* the sprayed and drying air flow in the same direction. Various temperature combinations were tried and the equipment was standardized to an inlet temperature of 150°C and outlet temperature of 60°C so as to obtain a good quality spray dried sweet cream butter milk powder.

Moisture, total solids, acidity, and solubility index of the sweet cream butter milk powder were estimated as per the procedure in IS:SP:18(part XI)-1981. The standard plate count (SPC) and coli form count were analysed as per the procedure described in IS:1479(Part-III)-1977.

RESULTS AND DISCUSSION

The percentage composition of the various constituents of sweet cream butter milk obtained from churning of cream during manufacture are given in Table 1.

The mean values of fat, protein, lactose, total solids, and

acidity were 1.06, 2.61, 3.50, 7.71 and 0.09 per cent, respectively. The fat percentage found in sweet cream butter milk coincides with the finding of Pal and Rajhoria (1985) and Mahran *et al.* (1988) and lactose, protein and total solids content found were in accordance with the findings of Chaudhari *et al.* (1992) and Joshi and Thakar (1993).

Table 2 shows the chemical and microbial quality of sweet cream butter milk powder obtained by spray drying. The average chemical composition of sweet cream butter milk powder obtained by spray were as : moisture 3.80 per cent, total solids 96.27 per cent, acidity 0.05 per cent and solubility index of 2.03 ml. This was in accordance with the specification of National Bureau of Standards (1986).

The standard plate count of sweet cream butter milk powder was 9.39×10^2 per gram and coliforms were absent. According to the findings of Lampert (1970) and as per the specification of National Bureau of Standards (1986), the total bacterial count should not exceed 50,000 per gram and coliforms should be absent. The observed values are less than the specifications of Lampert (1970) and National Bureau of Standards (1986).

It was also inferred that the sweet cream butter milk could be sprayed dry with an inlet temperature of 150°C and outlet temperature of 60°C. When the temperature combination is higher, it leads to caramelization and if it is lower it leads to caking of the powder.

The keeping quality of the spray dried sweet cream butter milk powder was found to be acceptable for three months. This can be utilized to replace skim milk powder in preparation of low fat yoghurt (Vijayalakshmi *et al.*, 1994). Sweet cream butter milk is used as a functional ingredient in many food products such as salad dressings, pasta sauces, cheese seasonings, ice cream mixes and in yoghurt because of its high phospholipids content (O'Connell and Fox, 2000). The powdered sweet cream butter milk is also more resistant to oxidation as there was no

Table 1 : Chemical composition of sweet cream butter milk

	Fat (%)	Protein (%)	Lactose (%)	Total solids (%)	Acidity (% lactic acid)
Range	0.5 to 1.7	1.8 to 3.5	3.0 to 4.4	6.5 to 8.3	0.04 to 0.17
Mean	1.06	2.61	3.5	7.71	0.09
S.D	0.4844	0.6177	0.5282	0.6610	0.4850
S.E	0.1978	0.2522	0.2156	0.2701	0.198

Average of Six Trials

Table 2 : Chemical and microbial qualities of sweet cream butter milk powder

	Moisture (%)	Total solids (%)	Acidity (% Lactic acid)	Solubility index (ml)	Standard plate count (per g)	Coliform count (per g)
Range	3.25 to 4.3	95.7 to 96.75	0.04 to 0.08	1.8 to 2.2	2×10^2 to 4×10^3	Nil
Mean	3.80	96.27	0.05	2.03	9.39×10^2	Nil
S.D	0.4308	0.3708	0.0154	0.1505	0.2083×10^1	Nil
S.E	0.176	0.151	0.0062	0.0614	0.0850×10^1	Nil

Average of Six Trials

rancidity noted during storage at refrigeration temperature of 5°C. This was in coincidence with the findings of Jinjark *et al.* (2006). It was also reported that powdered sweet cream butter milk also had higher desirable attributes such as sweet and cooked flavours.

Conclusion:

Sweet cream butter milk, a by product of the dairy industry almost goes as a waste in the dairy plant. It has to be effectively utilized in preparation of dairy products. Studies on concentration of butter milk revealed that butter milk can be spray dried at an inlet temperature of 150°C and outlet temperature 60°C, which resulted in a good quality sweet cream butter milk powder with better keeping quality.

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