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## Innovation in *kulfi* production: Standardizing the blend with beetroot extract and cost evaluation

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### Abstract

*Kulfi* is a traditional frozen dessert found in South Asia, sometimes referred to as “Indian ice cream”. It is popular in India, Myanmar, Pakistan and Bangladesh, as well as the Middle East. It can be found in Indian restaurants around the world. *Kulfi* originated in the Indian subcontinent during the Mughal era in the 16th century. It is often described as traditional Indian ice-cream and is famous in Bangladesh, Myanmar, Nepal, and Sri Lanka.

In the present study the *kulfi* was prepared from buffalo milk by using beetroot extract at different levels viz. 1 percent (T<sub>2</sub>), 3 percent (T<sub>3</sub>), 5 percent (T<sub>4</sub>) and 7 percent (T<sub>5</sub>) of the content. This prepared *kulfi* was compared with control (T<sub>1</sub>) i.e. without addition of beetroot extract. From the result of present investigation it may be concluded that beetroot extract could be successfully utilized for preparation of *kulfi*. The most acceptable quality *kulfi* can be prepared by using 3 percent beetroot extract and having production cost of ₹ 105.05 per Kg.

**Keywords:** *Kulfi*, production cost, beetroot extract

### Introduction

Milk is regarded as the complete food in the human diet. According to PFA *kulfi* is elaborated or explained as frozen product obtained from cow or buffalo milk or combination thereof with cream or other milk products with or without addition of different ingredients such as cane sugar, dextrose, liquid glucose, eggs, fruits, fruit juices, edible flavour and permitted food colours. It may contain permitted stabilizer and emulsifiers not exceeding 0.5 percent by weight. The products shall contain not less than 10 percent milk fat, 3.5 percent protein, 30 percent total solids. According to Anantakrishnan *et al.* (1994) [1], *kulfi* is described as an indigenous, condensed frozen dairy product. The preparation process involves boiling milk, sweetening it with sugar, and then concentrating it to 50 percent of its original volume. Following the cooling of 'malai,' the mixture is enriched with crushed nuts and flavourings, subsequently being dispensed into conical moulds. These moulds are sealed with screw caps and the edges are sealed airtight using dough. The frozen *kulfi* moulds are then placed in sizeable earthen vessels within an ice-salt mixture (1:1 ratio).

Today, there is an unprecedented interest by consumers, public health organizations and the medicinal community to improve health and wellness through dietary means. In recent years, a lot of interest has been generated in the development of milk products with vegetable, fruit and nuts based delicacies as they are rich source of various phytonutrients namely vitamins, minerals, antioxidants and dietary fibers. Various research workers have tried to utilize the extracts of various fruits and vegetables in preparation of different milk products. (Ukom and Obi 2018) [5]. Beetroot (*Beta vulgaris* L.) belonging to the Chenopodiaceae family stands out as an excellent dietary supplement being not only rich in minerals, nutrients and vitamins but also has unique phytoconstituents, which have several medicinal properties. Several parts of this plant are used in the medicinal system such as an anti-oxidant, anti-depressant, anti-microbial, anti-fungal, anti-inflammatory, diuretic, expectorant and carminative. It is one of the natural foods which boost the energy in athletes due to the highest nitrates and sugar content among plants (Yadav *et al.* 2016) [5]. Hence, considering the medicinal properties of Beetroot extract the present research project entitled Preparation of *kulfi* blended with beetroot (*Beta vulgaris*) extract was conducted.

### Material and Methods

For preparation of *kulfi*, buffalo milk was collected from dairy farm, Department of Animal

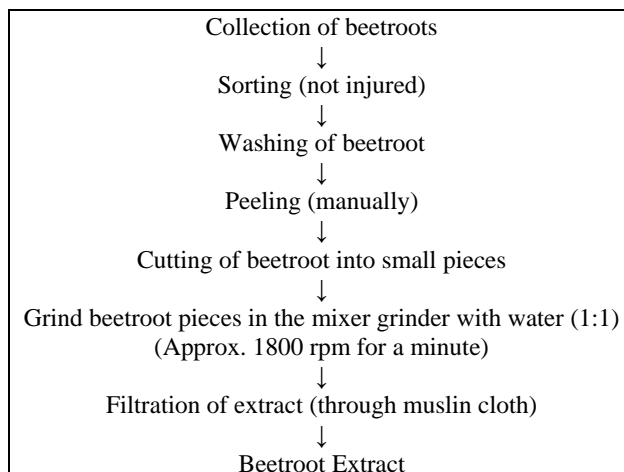
Husbandry and Dairy Science, College of Agriculture, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani. Sugar, beetroot, CMC and muslin cloth was purchased from local market.

### Manufacturing Technology

#### Preparation of beetroot extract

Beetroot extract was prepared by using the method described

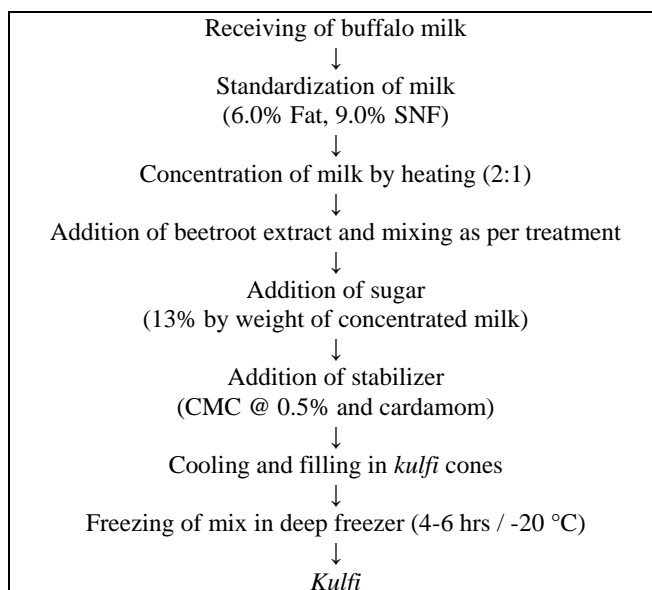
by Kamte (2015) [2]. For the preparation of beetroot extract, collected fresh beetroot was used. Beetroot were sorted without injury and washed thoroughly under clean tap water and dried by using clean cloth. After cleaning beetroot were peeled manually and cut into small pieces. Further the pieces were ground in mixer grinder with water (1:1 proportion) and the extract was collected in the beaker.



#### Preparation of kulfi

*Kulfi* was prepared by using the method described by Kale

A.B, (2011) [3] with slight modifications.



#### Treatment details

For preparation of *kulfi* blended with beetroot extract, beetroot extract was added in different levels and compared with the control. The details of the treatment combinations used are as below:

**T<sub>1</sub>**: 100 parts of concentrated buffalo milk (control).

**T<sub>2</sub>**: 99 parts of concentrated buffalo milk + 1 part of beetroot extract.

**T<sub>3</sub>**: 97 parts of concentrated buffalo milk + 3 parts of beetroot extract.

**T<sub>4</sub>**: 95 parts of concentrated buffalo milk + 5 parts of beetroot extract.

**T<sub>5</sub>**: 93 parts of concentrated buffalo milk + 7 parts of beetroot extract.

#### Result and Discussion

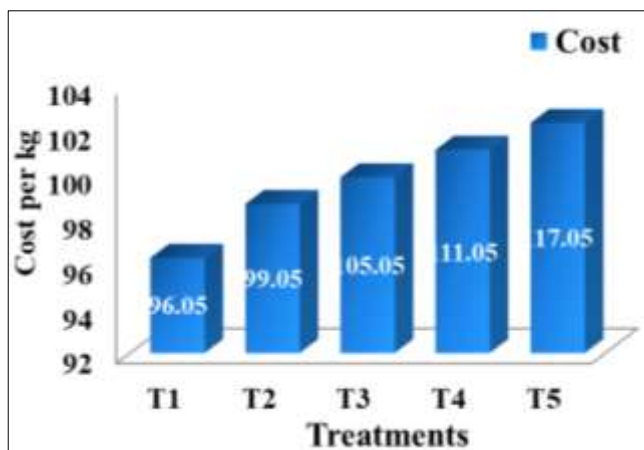
- **Standardization method of addition of beetroot extract for *kulfi* preparation:** The extract from the beetroot was extracted as discussed earlier. This extract was added to the *kulfi* after concentrating the milk and to this mixture sugar was added and to this mixture stabilizer was added. The sensory score revealed that this method of extract addition after concentrating the mixture is appropriate and provided desirable flavour, body and texture (consistency) and appearance to the product.
- **Cost of *kulfi* production:** All the ingredients required for the preparation of *kulfi* with the addition of beetroot extract were priced based on prevailing market rates for various items such as milk, sugar, CMC, and beetroot.

Other miscellaneous charges, including packaging, fuel, and electricity, were calculated based on the activities involved in preparing *kulfi* with the addition of beetroot extract. 7 percent beetroot extract. (T<sub>5</sub>), while lowest cost (₹ 96.05 per Kg) recorded in case of *kulfi* without

beetroot extract (T<sub>0</sub>). It was observed that the cost of *kulfi* increased with the increase in the level of beetroot extract. The production cost of most acceptable level (T<sub>3</sub>) was 105.05 per kg.

**Table 1:** Effect of various levels of Beetroot extract on cost of *kulfi*

Sr. no.	Particulars	Cost (Rs.)	T <sub>1</sub>		T <sub>2</sub>		T <sub>3</sub>		T <sub>4</sub>		T <sub>5</sub>	
			Qty.	Amt.	Qty.	Amt.	Qty.	Amt.	Qty.	Amt.	Qty.	Amt.
1	Buffalo milk (ml)	Rs.70/lit	1000 ml	Rs.70	900 ml	Rs.63	700 ml	Rs.49	500 ml	Rs.35	300 ml	Rs.21
2	Sugar (kg)	Rs.45/kg	130 g	Rs.5.85	130 g	Rs.5.85	130 g	Rs.5.85	130 g	Rs.5.85	130 g	Rs.5.85
3	Stabilizer (CMC)	Rs.400/kg	0.5 g	Rs.0.2	0.5 g	Rs.0.2	0.5 g	Rs.0.2	0.5 g	Rs.0.2	0.5 g	Rs.0.2
4	Beetroot extract	Rs.100/kg.	-	-	100 gm	Rs.10	300 gm	Rs.30	500 gm	Rs.50	700 gm	Rs.70
5	Miscellaneous charges (Rs.)	Rs.20	-	Rs.20	-	Rs.20	-	Rs.20	-	Rs.20	-	Rs.20
6	Total cost per kg (Rs.)	-	-	96.05	-	99.05	-	105.05	-	111.05	-	117.05



**Fig 1:** Effect of various levels of Beetroot extract on cost of *kulfi*

## Conclusion

From the results of the present investigation, it may be concluded that beetroot extract could be successfully utilized for preparation of *kulfi*. Addition of beetroot extract in *kulfi* improved the sensory as well as chemical quality and acceptability of the product. Besides typical flavour, it also adds medicinal properties to the product. Such flavouring did not appreciably affect the composition of lassi. The most acceptable quality *kulfi* can be prepared by using 3 percent beetroot extract and having production cost ₹ 105.05 per Kg

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