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SG Kadam

Department of Animal
Husbandry and Dairy Science,
Mahatama Phule Krishi
Vidyapeeth, Rahuri, Dist.
Ahmednagar, Maharashtra,
India

KD Chavan

Department of Animal
Husbandry and Dairy Science,
Mahatama Phule Krishi
Vidyapeeth, Rahuri, Dist.
Ahmednagar, Maharashtra,
India

Sensory quality of *Kalakand* Prepared by using ginger (*Zingiber officinale*) paste

SG Kadam and KD Chavan

Abstract

Ginger paste was used to prepare the *kalakand* so as to improve its nutritive value and value addition. The trials were conducted with different levels of ginger paste in *kalakand* to optimize the experimental treatments. Initially, *Kalakand* samples were prepared with 0, 0.25, 0.50, 0.75, 1.0, 1.25, 1.50 and 1.75 % of ginger paste and sugar @ 6%. On the basis of sensory evaluation, without ginger paste (T₀), 1% (T₁), 1.25% (T₂) and 1.50% ginger paste (T₃) with 6% sugar level were chosen for experimental trials. The *Kalakand* samples were stored at room temperature (27 ± 2°C) during storage period up to 5th day. Sensory quality of the fresh *Kalakand* were significantly (P < 0.05) influenced due to the blend of ginger paste in the *kalakand*. The mean sensory score for colour and appearance, body and texture, flavour and overall acceptability ranged from 8.26 (T₃) to 8.65 (T₂), 8.1(T₃) to 8.36 (T₂), 7.90 (T₃) to 8.62 (T₂), 7.20 (T₃) to 8.44 (T₂) for fresh *Kalakand* samples, respectively. The corresponding sensory score ranged from 5.04(T₃) to 6.28 (T₀), 7.10 (T₀) to 7.28 (T₂), 6.06 (T₃) to 7.06 (T₀) and 6.48 (T₂) to 7.42 (T₁), respectively during storage period.

Keywords: Ginger, sensory evaluation, *Kalakand*

Introduction

Kalakand is milk sweet prepared by blending and heating a mixture of dannedar *khoa* and sugar with continuous stirring until characteristic granular texture and pleasant caramelized flavor develops. Among the indigenous milk products, *kalakand* occupies an important place and found to be an attractive product amongst all the classes of consumers. It contains 70.4% total solids, 14.2% carbohydrates, 21% fat, 2.4% ash, 0.5% lactic acid, (Suresh and Jha, 1994) [9].

Kalakand has unique importance in market because it is liked by all classes of people. It has specially importance in various celebrations like wedding, inaugural functions, birthday and Diwali festival. Therefore the demand for this product is constant throughout the year. *Kalakand* is product having economic importance especially in rural part of India as it provides good means for converting surplus milk into value added product.

Several varieties of *Kalakand* i.e. fig *Kalakand*, mango *Kalakand*, ash guard *Kalakand*, sapota *Kalakand*, kashmiri *Kalakand*, strawberry *Kalakand*, plain *Kalakand* etc. All the varieties of *Kalakand* have distinct characteristics and method of manufacture vary from region to region. The base for all these types of *Kalakand* is however *Khoa* and sugar. In different proportions other ingredients are also incorporated to cater the special need of flavour, body and texture characteristics.

Ginger (*Zingiber officinale*) belonging to family *Zingiberaceae*. It is a major spice and has many uses in food as flavouring and having medicinal properties. The aroma of ginger is pleasant with flavour, slightly biting due to antiseptic or pungent compounds present in it, which make it indispensable in the manufacture of number of food products. Ginger has a several medicinal properties. Ginger protect against colon cancer as well as ovarian cancer (Anonymous 1977) [2]. According to the Ayurvedic medical system, ginger is carminative, stimulant and gives stimulating remedies. Ginger is a diaphoretic, spasmolytic and intestinal stimulant. Fresh ginger has been used for cold induced diseases, asthma, nausea, cough, heart palpitation, swelling and rheumatism. Ginger tea is a beverage in many countries, the tea is made by boiling peeled and sliced ginger to which brown sugar is often added. Drinking ginger tea with meal will greatly aid digestion and assimilation. Ginger extracts also have antibacterial, antispasmodic, antiulcer, antiallergenic and antioxidant qualities as well. It was therefore, decided to explore the possibility of utilizing ginger paste in the preparation of *Kalakand*.

Correspondence**SG Kadam**

Department of Animal
Husbandry and Dairy Science,
Mahatama Phule Krishi
Vidyapeeth, Rahuri, Dist.
Ahmednagar, Maharashtra,
India

Materials and Methods

Materials

Milk

The fresh crossbred cow milk samples were procured from the Research-Cum-Development project (RCDP) on cattle, Mahatma Phule Krishi Vidyapeet, Rahuri, Dist.Ahmednar (Maharashtra) for preparation of *kalakand*.

Cane sugar

Clean crystalline cane sugar was purchased from local market and used as sweetening and thickening agent.

Ginger

Ginger (*Zingiber officinale*) local variety was procured from local market.

Citric acid

Anhydrous citric acid was used as coagulant for coagulation of milk.

Karahi

An iron *karahi* having 31 cm diameter and 8.5 cm depth used for the desiccation of milk.

Khunti

The khunti having flattened end with a relatively sharp edge and long handle was used for stirring cum-scrapping the milk.

Stainless steel trays

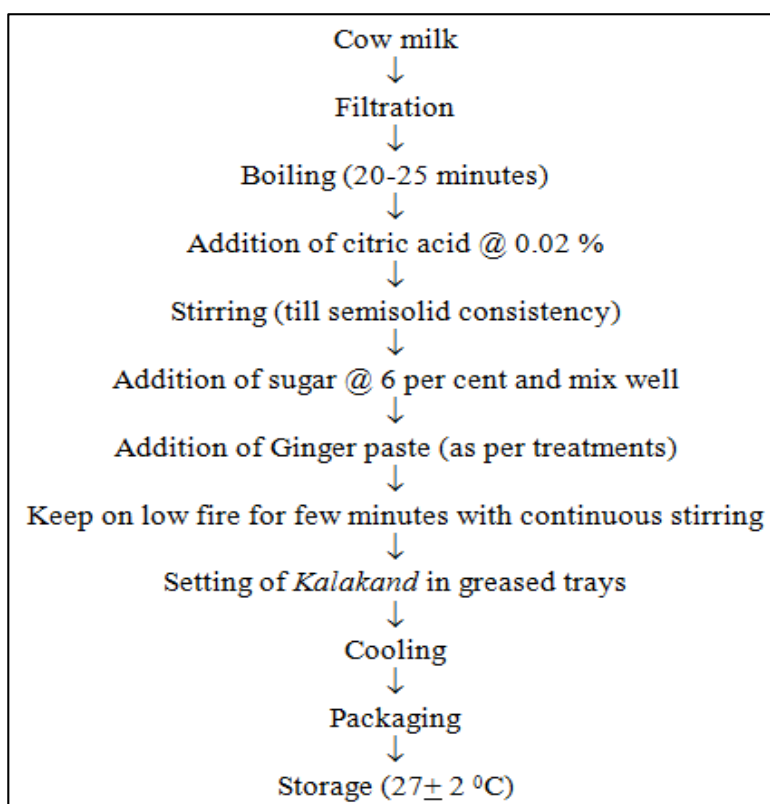
Stainless steel trays having 45cm length, 25cm width and 2 cm height was used for cooling of *kalakand* samples.

Packaging materials

Card board boxes of rectangular shape with butter paper lining was used for packaging of *kalakand* samples.

Methods

Kalakand samples were prepared by using procedure given by Aneja *et al.* (2002) ^[1]



Flow Chart for preparation of *Kalakand*

Pre-experimental trials

Pre-experimental trials were conducted to decide the levels of addition of ginger paste in the *kalakand* using 0, 0.25, 0.50, 0.75, 1, 1.25, 1.50 and 1.75 % of ginger paste and 6% sugar level for all treatments. The prepared samples of *kalakand* were subjected to sensory evaluation by the panel of 5 trained judges.

Sensory evaluation of *Kalakand*

Kalakand samples prepared under different pre-experimental and experimental treatments were subjected to sensory evaluation using the method described in the IS: 6273, part –I and part –II (1971) adopting 9 point Hedonic scale. A panel of five trained judges was formulated for this purpose. The samples were coded every time to conceal their identity and were offered to the judges for evaluation of sensory quality attributes.

Results and Discussion

Pre-experimental trials

Deciding the levels of addition of ginger paste in the *Kalakand*

The *kalakand* samples were prepared by blending of ginger paste i.e. 0, 0.25, 0.50, 0.75, 1.0, 1.25, 1.50 and 1.75 % levels. The samples were subjected to sensory evaluation.

Colour and appearance

The sensory score for colour and appearance ranged from 7.5 (T₁) to 7.7 (T₄ and T₅) (Table1). The sensory score for colour and appearance was significantly ($P < 0.05$) influenced due to blending of ginger paste levels in the *kalakand* samples. The treatments T₀ and T₇, T₁, T₂, T₆ and T₄ and T₅ were on par.

Table 1: Sensory evaluation of *Kalakand* samples (Pre-experimental trials) (Mean of three trials)

Sensory quality		Colour and appearance	Body and texture	Flavour	Overall acceptability
Treatment	Ginger paste %	Sensory score out of 9)			
T ₀	0	7.5 ^a	7.6 ^a	7.3 ^b	7.2 ^b
T ₁	0.25	7.6 ^b	7.7 ^b	7.5 ^b	7.3 ^b
T ₂	0.50	7.6 ^b	7.6 ^a	7.6 ^b	7.3 ^b
T ₃	0.75	7.6 ^b	7.6 ^a	7.6 ^b	7.4 ^c
T ₄	1.0	7.7 ^c	7.6 ^a	7.6 ^b	7.6 ^d
T ₅	1.25	7.7 ^c	7.7 ^b	7.8 ^c	7.9 ^f
T ₆	1.50	7.6 ^b	7.5 ^a	7.6 ^b	7.7 ^e
T ₇	1.75	7.5 ^a	7.5 ^a	6.7 ^a	7.0 ^a
SE (±)		0.030	0.04	0.10	0.05
CD at 5%		0.09	0.11	0.30	0.14

Body and Texture

The sensory score for body and texture of the product was significantly ($P<0.05$) influenced due to blending of different levels of ginger paste in the *kalakand* samples (Table 1). The body and texture score ranged from 7.5 to 7.7. Treatments T₀, T₂, T₃, T₄, T₆ and T₇ and T₁ and T₅ were on par.

Flavour

The mean flavour score ranged from 6.7 (T₇) to 7.8 (T₅). The flavour score of the *kalakand* samples significantly ($P<0.05$) influenced due to blending of ginger paste levels (Table 1). The treatment T₅ significantly differed among other treatments and also received the highest flavour score (7.8) than the rest of treatments. Treatments T₀, T₁, T₂, T₃, T₄ and T₆ were on par. Treatment T₇ also differed significantly among rest of the treatments. Treatment T₇ received the lowest flavour score (6.7). It might be due to the higher ginger paste level (1.75%) in the *kalakand* sample.

Overall acceptability

The overall acceptability of the *kalakand* samples significantly ($P<0.05$) influenced due to addition of different levels of ginger paste in the product (Table 1). The mean score was ranged from 7.0 (T₇) to 7.9 (T₅). The treatments T₄, T₅ and T₆ have higher overall acceptability score as compared to the rest of treatments. These three treatments also differed significantly among themselves and also rest of the treatments i.e T₀, T₁, T₂, T₃ and T₇. It was inferred that the better overall acceptability was observed in the *Kalakand* samples prepared by addition of 1, 1.25 and 1.50 % ginger paste and 6 % sugar level. The product prepared with these levels liked “very much” by the panel of judges.

Experimental trials

On the basis of the results of pre-experimental trials ginger levels were chosen to blend in the *kalakand* samples for experimental trials T₀: No ginger paste, T₁: 1 % ginger paste, T₂: 1.25 % ginger paste and T₃: 1.50 % ginger paste.

Sensory evaluation of *Kalakand*.

Table 2: Sensory quality of fresh *Kalakand*

Treatment	Sensory quality	Colour and appearance	Body and texture	Flavour	Overall acceptability
T ₀		8.33	8.20 ^a	8.04 ^a	7.38 ^b
T ₁		8.49	8.32 ^b	8.16 ^b	7.40 ^b
T ₂		8.65	8.36 ^b	8.62 ^c	8.44 ^c
T ₃		8.26	8.1 ^a	7.90 ^a	7.20 ^a
SE(±)		0.15	0.05	0.06	0.04
CD at 5%		-	0.14	0.17	0.13

Colour and Appearance

The colour and appearance is one of the important attribute of the sensory evaluation (Table 2). It is revealed that the mean sensory score for colour and appearance of the product under different treatments was non-significant. It means that the addition of different levels of ginger paste in the *Kalakand* samples did not influenced the colour and appearance of the product. The colour and appearance score of the *Kalakand* samples ranged from 8.26 (T₃) to 8.33 (T₀).

Sawant *et al.* (2006) [8] conducted studied on sapota fruit *Kalakand* and reported the sensory score by using 9-point hedonic scale as, colour and appearance 7.21 to 8.32.

Bhutkar *et al.* (2015) [3] admixed ash guard pulp to *Kalakand* and studied the sensory score using 9-point hedonic scale and the score for colour and appearance 8.0 to 8.5.

Body and Texture

The treatment differed significantly ($P<0.05$) among due to addition of different levels of ginger paste (Table 2). The mean score for body and texture ranged from 8.1 (T₃) to 8.36

(T₂). The treatment T₂ had highest sensory score (8.36) among all the treatments. The sensory score for body and texture of *Kalakand* samples under different experimental treatments showed significant ($P<0.05$) difference due to addition of different levels of ginger paste in the *Kalakand*.

Bhutkar *et al.* (2015) [3] admixed ash guard pulp to *Kalakand* and reported the sensory score for body and texture between 8.0 to 8.5. Patel and Roy, (2015) [7] also reported the significant variation in body and texture score of *Kalakand* sample prepared with different levels of papaya pulp.

Verma *et al.* (2009) [10] reported body and texture score in the range of 8.38-7.54 for *Kalakand* samples prepared with the different blend of cow and buffalo milk.

Flavour

The flavour of any product is the most important component of sensory attributes (Table 2). The mean score for flavour was 8.04, 8.16, 8.62, and 7.90 for the treatment Samples T₀, T₁, T₂ and T₃, respectively. the addition of different levels of ginger paste in the *kalakand* significantly ($P<0.05$) influenced

the flavour of the product. It might be due to level of gingerol content in the ginger. The highest sensory score received to the *Kalakand* sample (T₂) prepared by addition of 1.25 % Ginger paste in the *Kalakand* followed by T₃(1.5 %), T₁ (1%) and T₀(Control) samples. the sample treatment T₀ and T₃ were on par as T₁ and T₂ differed significantly among themselves. Sawant *et al.* (2006) ^[8] conducted studied on sapota fruit *kalakand* and reported the sensory score by using 9-point hedonic scale as flavour 8.22 to 8.95.

Dhanwade *et al.* (2006) ^[4] prepared *kalakand* from safflower milk blended with buffalo milk and reported the flavor score in the range of 6.40 to 8.75.

Bhutkar *et al.* (2015) ^[3] admixed ash guard pulp to *kalakand* and reported flavour score in between 8.0 to 8.5.

Overall acceptability

From (Table 2) it is seen that the addition of different levels ginger paste in the *Kalakand* samples significantly ($P < 0.05$) influenced the overall acceptability of the product. The mean sensory scores of experimental *Kalakand* samples under different treatments range from 7.20 (T₃) to 8.44 (T₂). The addition of ginger paste in the *Kalakand* significantly ($P < 0.05$) influenced the overall acceptability of the product. The treatment samples T₀ and T₂ were on par and T₂ and T₃ significantly differed among them. The highest sensory score 8.44 was observed in treatment T₂ over the rest of sample treatments.

Muley *et al.* (2012) ^[6] reported that the overall acceptability of different market sample of *kalakand* differed significantly and score ranged between 7.41-7.10.

Verma *et al.* (2009) ^[10] reported overall acceptability of samples of *kalakand* ranged between 8.11-7.51. i.e. liked moderately to liked very much. While studying the quality of product prepared from blend cow and buffalo milk.

Patel and Roy, (2015) ^[7] conducted studies on the value addition of *kalakand* using papaya fruit. They reported that the sensory score for flavour, colour and appearance, body and texture and overall acceptability was 8.8, 8.8, 8.7 and 8.7 respectively.

Bhutkar *et al.* (2015) ^[3] admixed ash guard pulp to *kalakand* and studied the sensory score and reported the score for overall acceptability in between 8.0 to 8.37.

Conclusion

Better quality *Kalakand* can be prepared by blending of 1.25 % ginger paste and 6 % sugar.

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