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Milk Badi prepared by using buffalo milk and wheat flour

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Abstract
Milk badi is a traditional dairy product. It is an integral part of our Indian heritage. It has been developed over a long period with the culinary skills of homemakers and halwais. Milk badi is prepared with wheat flour, maida and sugar. Maida is white flour from the Indian subcontinent. Finely milled without any bran, refined, and bleached, it closely resembles cake flour. The study was conducted to develop of maida blend milk badi and maida were assessed for its compositional, physico-chemical properties, sensory attributes, and microbiological quality. Trail was conducted to adjust the most acceptable levels of maida blended milk badi (5%, 10% and 15%). On the basis of sensory evaluation and physico-chemical analysis of product. The final product optimized contains 5% of maida which was highly acceptable and be used to develop a product without adversely affecting the sensory attributes of milk badi. The milk badi prepared without any addition of maida was treated as control. The optimized product contains fat (11.70%), Protein (12.62%), ash (26.73%), ash (1.83%), total solids (52.88%), total soluble solid (36.53) and titratable acidity (0.22%) content respectively. The price maida blend milk badi was found to be (47.7 Rs/ kg) of optimized product.

Keywords: Milk badi, Buffalo milk, wheat flour, Maida and sugar

Introduction
Traditional dairy products and sweets are an integral part of Indian heritage. They have been developed over a long period with the culinary skills of homemakers and halwais (sweetmeat makers). In the present context, the mass appeal enjoyed the indigenous sweets can be known by the fact that about 50 per cent of India's milk production is utilized for making these products (Bandyopadhyay *et al.,* 2006) [2]. At present in India, more than 150 types of milk based sweetmeats are available. Among them, Peda, Burfi and Kalakand are dominating the market of Khoa based heat desiccated milk sweets.
Buffalo milk (BM) plays an important role in human nutrition particularly in the developing countries. Compared with cow milk, buffalo milk is richer in almost all the main milk nutrients. The composition, properties and processing of buffalo milk and milk products has been the subject of several reviews (Laxminaryana and Dastur 1968; Abd El-Salam 1990; Gokhale *et al.*, 2001; Pandya *et al.,* 2004) [4, 1, 3, 6]. However, considerable literature has been accumulated in recent years on the composition, properties and processing of BM. The focus of the present review is to highlight the recent knowledge on the detailed composition and properties of buffalo milk. Buffalo milk is characterized by high levels of fat, lactose, protein, casein, and ash contents as described in an early review (Laxminaryana and Dastur, 1968) [4].
Wheat grain on maturity improves and stores the proteins, starch, lipids and sugars in the endosperm for the next generation. Humans are benefited with these stored foods for their nutrient needs (Uthaya kumar and Wrigley, 2010) [11]. Over 90% of the wheat grown worldwide is *Triticum aestivum*. This variety is used for a wide range of applications, such as bread, cakes, pastries, biscuits, puddings and noodles. T. durum is mainly used for varieties of pasta production. The common wheat's of today are divided into red and white wheat. Most of the wheat grown in India is bread and macaroni varieties. The properties of wheat flour vary not only as a result of the type of wheat used to make the flour but from season to season from supposedly the same sort of wheat. Wheat gluten is unique among cereal and other plant proteins in its ability to form a cohesive blend with viscoelastic properties once plasticized.

Maida is white flour from the Indian subcontinent. Finely milled without any bran, refined, and bleached, it closely resembles cake flour. Maida is used extensively for making fast foods, baked goods such as pastries, bread (Monu, 2011) [5] several varieties of sweets, and traditional flatbreads (Sharon 2007) [7] Owing to this wide variety of uses, it is sometimes labelled and marketed as "all-purpose flour", though it is different from all-purpose flour.

Badi is a legume-based ready-to-fry product, popularly consumed in India, Pakistan and Bangladesh. Badi is also prepared in rural and urban area of Lucknow zone in Utter Pradesh. It is prepared with admixture of different ingredients like black gram, dal, wheat flour, rice flour, corn flour etc.

Material and Method
The experiments related to studies on development of Milk Badi blended with maida and buffalo milk was carried out in the Laboratory of Warner College of Dairy Technology, SHUATS, (UP) Prayagraj.

Procurement and Collection of Ingredients
Maida, Buffalo milk and sugar was collected from the local market of Prayagraj, Uttar Pradesh for the preparation of milk badi with wheat flour and Maida. Wheat flour was also procured from the local market of Prayagraj

Treatment Combination
In the present study, Four treatments were formulated *viz*. T0, T1, T2 and T3 where in T0 is control Milk badi (100WF:00), T1 was prepared 95% wheat flour and 5% maida (95%WF + 5%M), T2 was prepared 90% wheat flour and 10% maida (90%WF + 10%M), T3 was prepared 85% wheat flour and 15% maida (85%WF + 15%M).

Sensory or Organoleptic Score
The sensory evaluation of milk badi blended with maida and buffalo milk samples was done by a panel of judge using a 9 point hedonic scale. The experienced Technical staff members of the Warner college of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj served as a judging team and evaluated the samples of different treatment of milk badi blended with maida and buffalo milk. Numerical score were allocated for flavour, Body and Texture, Colour and appearances and overall acceptability of sample.
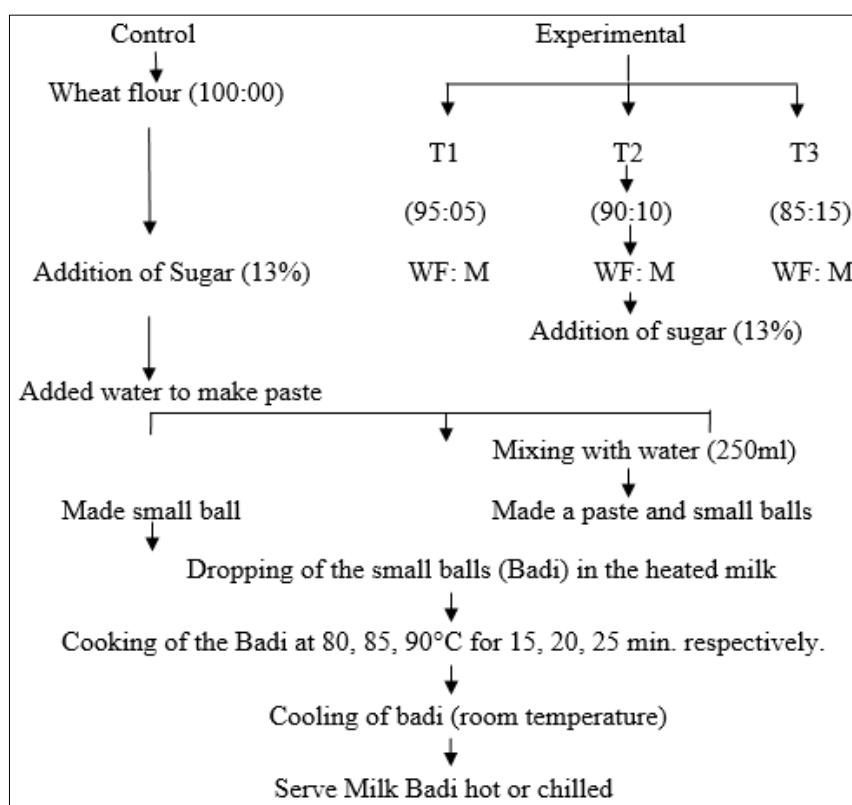

Fig 1: Flow diagram for manufacturing of Buffalo milk Badi

Results and Discussion
The milk badi blended with maida and buffalo milk were analyzed for different parameters *viz*. Physico-Chemical analysis (Fat, Protein, Total carbohydrate, ash, Moisture, Total solid, Titratable Acidity, Total Soluble Solid (Brix°)) was done for estimating its nutritional contents of milk badi sample.

Physical Properties of Milk Badi
In view of investigation physical properties of milk badi are shown in Table 1. It was observed that the physico- chemical

properties in control and other experimental in maida blended milk badi sample of different treatment. The mean value of total solid content of treatment *viz*. T_0, T_1, T_2 and T_3 was found to be 47.96, 52.88, 56.66, and 558.72% respectively. Total solid content of milk badi blended with maida and buffalo milk, highest mean was observed in T_3 and lowest was observed in T_0. The mean treatment values were increased form T_0 to T_3 experimental samples so the total solid of different treatment increased significantly ($p<0.05$). Similar observations were made by the Shiva *et al*., (2019) [13].

Table 1: Physico-Chemical properties of milk badi blended with maida and buffalo milk.

Treatment	T0	T1	T2	T3	C.D. value
Physico-chemical Analysis					
Fat (%)	10.34	11.70	13.16	13.45	0.105
Protein (%)	10.80	12.62	13.40	13.84	0.430
Total Carbohydrate (%)	25.13	26.73	28.15	29.34	0.899
Ash (%)	1.73	1.83	1.95	2.09	0.6463
Moisture (%)	52.04	47.12	43.34	41.28	0.6465
TS (%)	47.96	52.88	56.66	58.72	0.939
Titratable Acidity (% LA)	0.21	0.22	0.24	0.27	0.6461
Total Soluble Solid (brix)	32.19	32.35	33.40	34.47	0.6460

The results indicated that a gradual reduction of the mean moisture content was observed till it reached a maximum level after addition of maida. Moisture content of maida blended milk badi, highest mean was observed in T_0 and lowest was observed in T_3. The mean treatment values were decreased from T_0 to T_3 experimental samples so the moisture content of different significantly ($p<0.05$). Similar observation were made by Singh *et al.,* (2017) [9] on effect of stevia on the chemical composition of low herbal calorie kulfi.

The highest fat percentage was observed in T_3 treatment and lowest fat content was noted in treatment T_0. Level of maida in the milk badi increased, the fat content of milk badi from it also increased. The mean value of fat percentage in milk badi blended with maida and buffalo milk sample of different treatments T_0, T_1, T_2 and T_3 was found to be 10.34, 11.70, 13.16, and 13.45% respectively. It was observed that mean treatment values were increased from T_0 to T_3 experimental sample so the fat of different treatment also was increased significantly ($p<0.05$). Similar observation was made by Shiva *et al*., (2019) [13].

The mean value of protein content of treatment T_0, T_1, T_2 and T_3 was found to be 10.80, 12.62, 13.40, and 13.84 respectively. The presented data of maida blended milk badi highest mean protein percent was observed in T_3 followed T_2, T_1 and T_0. It can be observed from Table 1, that the values for protein increased with the increased in proportion of maida. Similar observation were made by Shiva *et al*., (2019) [13].

The mean value of total carbohydrate of four treatment *viz.* T_0, T_1, T_2 and T_3 was found in the range of 25.13 to 29.34 percent. Total carbohydrate content of maida blended milk badi highest mean carbohydrate percentage was observed in T_3 (29.34) followed by T_2 (28.15), T_1 (26.73) and T_0 (25.13). The total carbohydrate content of the maida blended milk badi was significantly higher than the control. It was observed that mean treatment values were increased from T_0 to T_3 experimental samples so that carbohydrate of different treatment increased significantly ($p<0.05$). The results are similar to the report of Shiva *et al.,* (2019) [13].

The data regarding Ash content in milk badi blended with maida and buffalo milk sample of different treatments are shown in Table 1. The mean value of Ash percentage of treatment T_0, T_1, T_2 and T_3 was found to be 1.73, 1.83, 1.95, and 2.09 respectively. The ash content of milk badi blended with maida and buffalo milk highest mean was observed in T_3 and lowest was observed in the sample of T_0. It indicates that increased the level of maida, the ash content was also increased. The results are similar to the report of Shiva *et al.,* (2019) [13].

The data regarding titratable acidity in maida blended milk badi sample of different treatments are shown in Table 1. The

mean value of titratable acidity percent lactic acid of treatment T_0, T_1, T_2 and T_3 was found to be 0.21, 0.22, 0.24, and 0.27 respectively. The titratable acidity of milk badi blended with maida and buffalo milk highest mean was observed in T_3 and lowest was observed in the sample of T_0. It indicates that increased the level of maida, the titratable acidity was also increased. Similar observation were made by Shiva *et al.*, (2019) [13] on flaxseed powder kulfi.

The mean value of lightness of treatment T_0, T_1, T_2 and T_3 was found to be 99.07, 98.92, 98.76 and 98.51 respectively. The presented data of camel milk powder kulfi highest mean lightness was observed in T_0 followed by T_1, T_2 and T_3. It can be observed from Table 1 that the values for lightness decreased with the increased in proportion of camel milk powder. Similar observation was made by Shuddhodhan (2012) [8] reported the similar trends in study wherein the authors worked iron and zinc fortification of Neutri mix based on milk and pearl millet.

The mean value of Total soluble solid of treatment T_0, T_1, T_2 and T_3 was found to be 32.19, 32.35, 33.40, and 34.47 respectively. The presented data of maida blended milk badi highest mean total soluble solid was observed in T_3 followed by T_2, T_1 and T_0. It can be observed from Table 1, that the values for whey nitrogen increased with the increased in proportion of camel milk powder.

Microbial Properties of milk badi
The mean value of standard plate count of treatment T_0, T_1, T_2 and T_3 was found to be 44.80, 39.40, 43.60 and 51.25 respectively. The standard plate count of milk badi blended with maida and buffalo milk, highest mean standard plate count was recorded in T_3 (51.25) followed by T_0 (44.80), T_2 (43.60) and T_1 (39.40). There are non-significant difference ($p<0.05$) between these treatments. The results agreed with the report of Siva *et al.,* (2019).

Table 1: Microbial Analysis of milk badi blended with maida and buffalo milk.

Treatment	T0	T1	T2	T3	C.D. value
SPC ($\times10^4$ cfu/g)	44.80	39.40	43.60	51.25	0.646
Yeast and Mould ($\times10^2$ cfu/g)	5.00	0.00	8.60	12.20	0.646
Coliform ($\times10^1$ cfu/g)	Nil	Nil	Nil	Nil	Nil

The mean value of yeast and mold count in milk badi blended with maida and buffalo milk sample of different treatments T_0, T_1, T_2 and T_3 was found to be 5.00, 0.00, 8.60 and 12.20 respectively. The yeast and mold of milk badi, highest mean yeast and mold was recorded in T_3 (12.20) followed by T_2 (8.60), T_0 (5.00) and T_1 (0.00). There are non-significant difference ($p<0.05$) between these treatments.

Coliform was observed absent in all the milk badi samples which is indicating that excellent hygienic condition were maintained during the preparation and while storage time gave an excellent results of the products.

Sensory characteristics of Milk badi
Organoleptic characteristic like (colour and appearance, Flavour, body texture and overall acceptability) was evaluated by sensory methods using in 9 point hedonic scale. Mean values of Organoleptic characteristic was given in Table 3.

Table 3: Sensory evaluation of Prepared Milk Badi

Treatment	T0	T1	T2	T3	C.D. value
Colour and Appearance score	8.00	8.60	7.60	7.60	0.63
Flavour score	7.80	8.80	7.70	7.20	0.590
Body and Texture score	7.80	8.80	7.30	7.30	0.744
Overall acceptability score	7.86	8.73	7.50	7.40	0.670

In view of investigation Organoleptic characteristics of milk badi are shown in Table 2.
The Milk badi samples prepared by addition of different level of maida were cited to sensory evaluation using 9- hedonic scale which was conducted by trained panelists. The milk badi samples are rated flavour, colour and appearance, body and texture and overall acceptability. The data revealed that the sensory scores of wheat flour badi from blended of maida and buffalo milk, the sample T_1 got highest score for flavour, colour and appearance, body and texture and overall acceptability as 8.80, 8.60, 8.80 and 8.73 respectively.
The Table 2 reveals that the mean score for flavour of maida blended milk badi was found to be in the range of 7.20 to 7.80.
The colour and appearance score of maida blended milk badi of the mean value of T_0, T_1, T_2 and T_3 was found to be 8.0, 8.60, 7.60 and 7.60 respectively. The highest mean colour and appearance score was recorded in T_1 and lowest was in T_2 and T_3.
Similarly, the mean scores of body and texture of maida blended milk badi of different treatments was found in the range of 7.30 to 8.80. The highest mean of body and texture was recorded in T_0 and T_1 and lowest was recorded in T_2 and T_3. The different treatments were observed to be significantly different ($p<0.05$).
Table 2 also reveals that for overall acceptability score of maida blended milk badi ranged from 7.40 to 8.86. The result obtained in the study indicates that the variation amongst sensory scores for different treatments were found to be significant difference ($p<0.05$).

Conclusion
From the investigation, it is evident that development of wheat flour badi can be effectively used in the formulation of milk badi mix by properly blending it in appropriate proportions with other ingredients like wheat flour, maida and sugar. The data obtained from Organoleptic evaluation showed that the milk badi prepared from formulated mix sample in the treatment T1(95:05) was found to be more acceptable in terms of colour & appearance, flavour, body and texture and overall acceptability. Thus, this study has shown a way for effective utilization of readily available buffalo milk. On the basis of microbiological analysis the formulated milk badi sample in treatment T3 (85:15) showed satisfactory results for SPC and Yeast & Mold counts. The cost of milk

badi was estimated to be Rs.47.46 and Rs.47.8/kg respectively

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