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Studies on sensory attributes of *burfi* blended with different levels of dragon fruit powder

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Abstract
The study was conducted in the Department of Animal Husbandry and Dairy Science, College of Agriculture, Parbhani. Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, under the title "Process standardization for the manufacturing of novel fruit *Burfi* by using dragon fruit (*Selenicereus undatus*) powder" In the present investigation the attempt was made to study the sensory properties of *burfi* prepared by using different levels of dragon fruit powder. The *burfi* was prepared from buffalo milk (standardized with 6 percent fat and 9 percent SNF) preparing *khoa* and the different level of dragon fruit powder (4%, 8%, 12%, 16% and 20%) is added and *khoa* as 100%, 96%, 92%, 88%, 84% and 80% in treatments T_1, T_2, T_3, T_4, T_5 and T_6 treatment T_1 taken as a control prepared from buffalo milk only. The average mean values for colour and appearance were observed as 7.84, 8.24, 8.28, 8.57, 7.30 and 6.62 for treatments T_1, T_2, T_3, T_4, T_5 and T_6 respectively. The average mean score of flavour for *burfi* were observed as T_1 (8.28), T_2 (8.44), T_3 (8.54), T_4 (8.58), T_5 (7.69) and T_6 (6.70) the highest score of flavor was for T_4 which is prepared with 12% of dragon fruit powder which gives typical flavor of dragon fruit to the *burfi*. The mean score for body and texture for the *burfi* were observed as T_1 (8.28), T_2 (8.37), T_3 (8.51), T_4 (8.72) T_5 (7.60) and T_6 (6.13) the body and texture score for treatment T_4 is highest than other treatments. The average mean score for overall acceptability of *burfi* were 8.23, 8.43, 8.40, 8.54, 7.59 and 6.29 for treatments T_1, T_2, T_3, T_4, T_5 and T_6 respectively.

Keywords: Buffalo milk, sensory properties, dragon fruit, *burfi*, *khoa*

Introduction
Burfi is one of the *khoa* based indigenous milk product prepared from cow and buffalo milk and is relished in India. It is highly nutritious product as it containing almost all milk solids in concentrated form easily digestable carbohydrate in the form of cane sugar and variety of other additives. Several varieties of *burfi* are sold in the market depending on the additives present, viz., plain, mawa, pista, nut, chocolate, coconut and rawa *burfi*, and any fruit falvoured *burfi* depending on the ingredients used in the preparation of the products. The base for all these varieties of *burfi* is *khoa* and cane sugar in varying proportions. *Burfi* is prepared by heating the mixture of *khoa* and sugar to a near homogenous consistency followed by cooling and cutting it into small cuboids. Dragon fruit (*Selenicereus undatus*) which is rich in vitamins, fiber and natural antioxidants, is one of the most popular commercial fruits available in India. The fruit is eaten as fresh fruit chilled by peeling away the skin or as dried fruit. Dragon fruit is believed to able to lower cholesterol concentration, to balance blood sugar concentration, to prevent colon cancer, to strengthen kidney function and bone, to strengthen the brain workings, increasing the sharpness of the eyes as well as cosmetic ingredients (Suryono, 2006) [6]. The fruit pulp is rich in antioxidants and vitamin C, polyunsaturated (good) fatty acids, B vitamins, carotene, protein and minerals like calcium, iron, potassium, sodium, etc.

Materials and Methods
The current study was conducted in the Department of Animal Husbandry and Dairy Science, College of Agriculture, Parbhani. Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, under the title "Process standardization for the manufacturer of novel fruit *burfi* by using dragon fruit (*Selenicereus undatus*) powder".

Materials
Following materials and ingredients were used to meet the objectives of the present study

Collection of Buffalo Milk
Buffalo milk
Fresh buffalo milk was taken from dairy farm of Dept. of AHDS, COA, Parbhani.

Dragon fruit powder
Readymade pink dehydrated dried dragon fruit powder was procured from market.

Sugar
Food grade sugar was purchased from local market and was grinded using a grinder or mixer.

Karahi
An iron *Karahi* having 31 cm diameter and 8.5 cm depth with a capacity to hold three liters of milk was used for the desiccation of milk.

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

Gas shegadi
The gas shegadi available in the department of Animal Husbandry and Dairy Science was used for preparation of *burfi*.

Stainless steel trays
Stainless steel trays having 45 cm length, 25 cm width and 2 cm height was used for preparing of *burfi* blocks.

Balance
Electronic precision balance was used for weighing samples, ingredients and chemicals etc. throughout the analysis of *burfi*.

Packaging material
The prepared dragon fruit *burfi* was packed in cardboard box and polystyrene cup for further study.

Treatment combinations
Treatment details for preparation of "Process standardization for the manufacturing of novel fruit *burfi* by using dragon fruit (*Selenicereus undatus*) powder" are going to be used as follows
T_1 – 100% *Khoa*
T_2 – 96% *Khoa* + 4% Dragon fruit powder
T_3 – 92% *Khoa* + 8% dragon fruit powder
T_4 – 88% *Khoa* + 12% dragon fruit powder
T_5 – 84% *Khoa* + 16% dragon fruit powder
T_6 – 80% *Khoa* + 20% dragon fruit powder

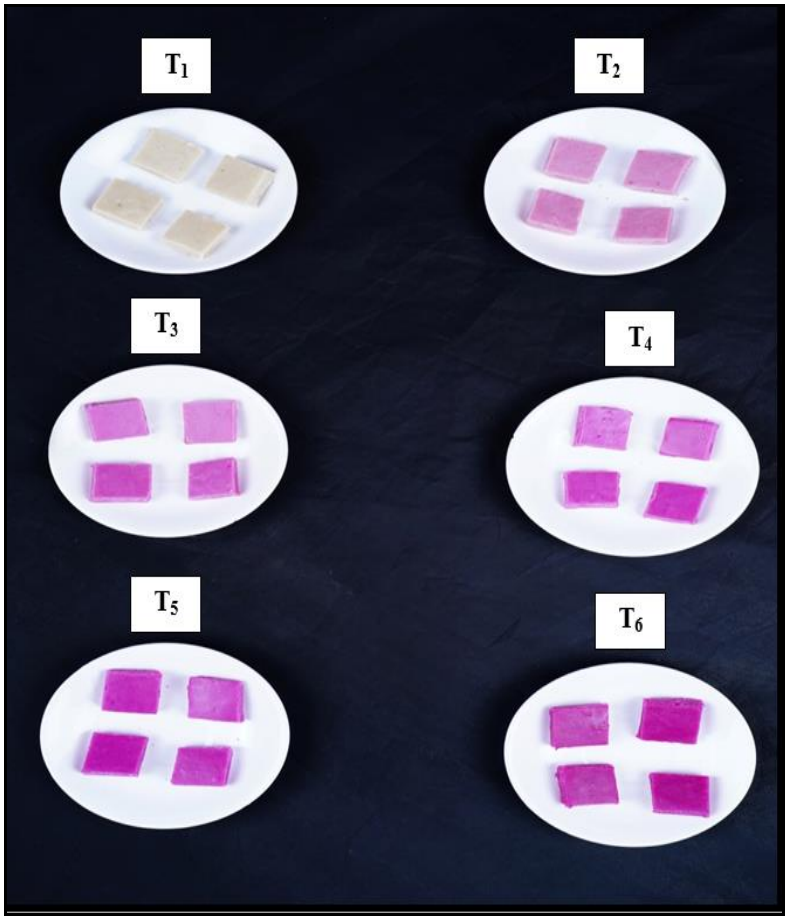

Fig 1: Different treatment combination of dragon fruit *burfi*

Fig 2: Sensory evaluation of different treatments of dragon fruit powder carried by panel of judges

Results and Discussion

Sensory evaluation of *burfi* prepared by using dragon fruit powder

Sensory evaluation is defined as scientific method of used to analyze and interpret those responses to products as perceived through the senses of sight, smell, touch, taste, and hearing.

Burfi made from buffalo milk with addition of dragon fruit powder with different concentrations were took for sensory attributes such as colour and appearance, flavour, body and texture, and overall acceptability by semi-trained panel of judges by using a 9-point hedonic scale and the data so obtained, where analysed by using completely randomized design (CRD).The data were analyzed statistically by using Completely Randomized Design (CRD) as per Panse and Sukhatme (1985) [8]. The score given by judges for different parameters were recorded and further discussed into the following Tables and graphs.

Effect of addition of dragon fruit powder on colour and appearance score

The most important attribute of any products sensory is colour and its appearance. Colour and appearance is one of the most important sensory properties of any product. The average score for colour and appearance with respect to different treatments is shown in Table 1.

Table 1: Colour and appearance score of *burfi* as influenced by different levels of dragon fruit powder

Treatments/Replications	Colour and appearance score					Mean Score
	R I	R II	R III	R IV	R V	
T_1	8.00	7.00	7.50	8.40	8.30	7.84^{bc}
T_2	8.00	8.10	8.60	8.20	8.30	8.24^{ab}
T_3	8.10	8.00	8.50	8.00	8.80	8.28^{ab}
T_4	8.20	8.30	8.70	8.80	8.85	8.57^{a}
T_5	7.40	7.50	7.75	7.32	6.55	7.30^{c}
T_6	7.20	6.30	6.60	7.00	6.00	6.62^{d}
	S.E.±0.188 C.D. at 5% 0.548 Values with superscripts are significantly different at (p<0.05)					

The average mean colour and appearance score for various treatments ranged between 6.62 to 8.57. This score for T_4 treatment was higher than rest of the treatments. The acceptable highest score was for T_4 (8.57) which has medium pinkish colour as compared to other *burfi* trials. The lowest score was for T_6 (6.62) with very dark in appearance having 20 percent dragon fruit powder is added. Among the added levels of dragon fruit powder the highest score for general appearance was *burfi* having 12 percent dragon fruit powder with medium pink in appearance and appeared fresh whereas *burfi* obtained from 20 percent dragon fruit powder with totally dull and dark appearance which was not liked so much by judges. The significant differences were observed between treatments T_1, T_2, T_3, T_4 T_5 and T_6. This might be due to higher levels of dragon fruit powder gives uneven dark pinkish colour and dull appearance to the *burfi* which decreases its acceptability.

Effect of addition of dragon fruit powder on flavour score

The flavour is very important among the other properties because of its feeling and quality indication of food. Flavour plays vital role in determining the acceptability of foods. It includes smell and taste of the products. The data related to sensory score for flavour with different levels of dragon fruit powder is showed in Table 2.

Table 2: Flavour score of *burfi* influenced by different level of dragon fruit powder.

Treatments/Replications	Flavour score					Mean score
	R I	R II	R III	R IV	R V	
T_1	8.20	8.10	8.60	8.50	8.00	8.28^{a}
T_2	8.30	8.20	8.80	8.60	8.32	8.44^{a}
T_3	8.25	8.32	8.65	8.50	9.00	8.54^{a}
T_4	8.00	8.20	8.90	8.80	9.00	8.58^{a}
T_5	7.40	7.50	8.40	7.60	7.55	7.69^{b}
T_6	7.20	6.50	7.00	6.60	6.00	6.70^{c}
	S.E.±0.163 C.D. at 5% 0.477 Values with superscripts are significantly different at (p<0.05)					

From the table 2. it observed that flavour score were 8.28, 8.44, 8.54, 8.58 7.69 and 6.70 for *burfi* prepared under T_1, T_2, T_3, T_4, T_5 and T_6 treatments respectively. This showed that as the level of dragon fruit powder increases the flavour score of *burfi* also increases upto T_4 but it decreases after T_4 treatments the flavour score decreases. For flavour characteristic, *burfi* prepared under different treatments differ significantly. The highest score of flavour was for T_4 (8.58) with 12 percent dragon fruit powder due to acceptable amount of added dragon fruit powder gives typical flavour while the lowest score was for T_6 (6.7) treatment with 20 percent of dragon fruit powder.

Effect of addition of dragon fruit powder on body and texture score

Body and texture is one of the essential parameter of every milk product and it is one of the reason for attracting sellers towards milk products. Both body and texture are opposite of each other for food with their acceptability. For the sensory evaluation it has huge significance. The sensory score for the body and texture with respect to the different levels of dragon fruit *burfi* is given in the Table 3.

Table 3: Body and texture score of *burfi* influenced by different levels of dragon fruit powder.

Treatments/ Replications	Body and texture score					Mean score
	R I	R II	R III	R IV	RV	
T_1	8.10	8.00	8.50	8.40	8.40	8.28^{b}
T_2	8.15	8.70	8.60	8.30	8.10	8.37^{ab}
T_3	8.50	8.65	8.88	8.00	8.50	8.51^{ab}
T_4	9.00	8.80	8.55	8.45	8.80	8.72^{a}
T_5	7.30	7.40	8.30	7.50	7.50	7.60^{c}
T_6	6.25	6.00	6.10	6.32	6.00	6.13^{d}
	S.E.±0.125 C.D. at 5% 0.359 Values with superscripts are significantly different at (p<0.05)					

In the Table 3 it was observed that body and texture score for treatments T_1, T_2, T_3, T_4, T_5 and T_6 was 8.28, 8.37, 8.51, 8.72, 7.60 and 6.13 respectively. The highest body and texture score was obtained for the *burfi* blended with 12% dragon fruit powder. The excess level of dragon fruit powder more than 12% body and texture score was slightly decreases this might be due to crushy structure of dragon fruit powder**.**

Effect of addition of dragon fruit powder on overall acceptability score

Overall acceptability is the average score for all the sensory attributes of the final product. Overall acceptability can be considered as complex parameter of product that finalize its acceptability to consumer. The average score for overall acceptability for dragon fruit *burfi* is given below in Table 4.

Table 4: Overall acceptability score of *burfi* influenced by different levels of dragon fruit powder.

Treatments/ Replications	Overall acceptability score					Mean score
	R I	R II	R III	R IV	R V	
T_1	8.10	8.06	8.50	8.43	8.04	8.23^{a}
T_2	8.16	8.13	8.70	8.53	8.62	8.43^{a}
T_3	8.30	8.10	8.25	8.60	8.75	8.40^{a}
T_4	8.26	8.46	8.80	8.70	8.50	8.54^{a}
T_5	7.36	7.46	8.10	7.63	7.40	7.59^{b}
T_6	6.00	6.50	6.10	6.63	6.20	6.29^{c}
	S.E. ± 0.115 C.D. at 5% 0.337 Values with superscripts are significantly different at (p<0.05)					

The mean score overall acceptability score were 8.23, 8.43, 8.40, 8.54, 7.59 and 6.29 under the treatments T_1, T_2, T_3, T_4, T_5 and T_6 respectively. Since the overall acceptability score of all the samples were above 6, it was defined that dragon fruit *burfi* which prepared under all treatments were acceptable.

Conclusion

From present investigation it was observed that the dragon fruit powder can be used for acceptable *burfi* preparation on the reason of sensory properties of *burfi.* The nutritional and long shelf life *burfi* can be made by using dragon fruit powder for completing consumer's demand as a value added product. The sensory parameters related with dairy product was recorded and which scored more than 8 ranged in between like very much to like extremely on 9-point hedonic scale. In the present research, as the level of dragon fruit powder in *burfi* increases change in sensory properties of *burfi* was observed.

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