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Studies on consumer response for newly developed Low-calories and Low-sugar *Kalam*

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Abstract
The low-calories and low-sugar *kalam* was prepared by using maltodextrin, sugar and aspartame in suitable combination after optimization in the laboratory of Department of Animal Husbandry and Dairy Science, College of Agriculture, Latur, VNMKV, Parbhani during the year 2016-17. The developed product was analyzed for sensory evaluation by serving the product to 100 consumers. The selections of consumers were done purposefully among diabetic, heart disease, obesity and normal consumers with considering their age profile. The formulation of buffalo milk with 3 per cent fat, 1 per cent maltodextrin (on the basis of milk) and 10 per cent sugar & 0.10 per cent aspartame (on the basis of *khoa)* were found suitable for preparation of low-calories and low-sugar *kalam*. The developed *kalam* samples were tasted for 100 consumers selected at randomly on the basis of age, sex and health groups. It is concluded that 55 consumers suffering from diabetic, heart diseases and obesity, 33 consumers liked the developed *kalam* extremely and liked very much.

Keywords: Low- calories, low sugar, *Kalam*, consumer response

Introduction
In India most of traditional dairy product contains high fat and also high sugar (Pal & Raju, 2007) [5]. *Peda* and *Burfi* are the two major *khoa* based sweets, which are highly popular among Indians, mainly because of their delicious taste and high nutritional value. It has been reported that the quantity of *peda* produced in India exceeds any other indigenous milk based sweet (Mahadevan, 1991) [4]. Fat replacers sometimes referred as fat substitutes or fat replacements are ingredients that mimic some of the roles of fat in food processing. The ideal fat replacer is a safe compound consumed with no health risk. It has all the functional and organoleptic properties of fat (taste and appearance characteristics such as richness, flakiness and sheen) with significantly fewer calories than fat (Hope Warshaw and Marion Franze, 1996) [3].
It can serve as an excellent carrier product for extra nutrient and if enriched or fortified it can satisfy the nutritional needs of the people (Krupa *et al*. 2011). In India most of traditional dairy food contains high fat and also high sugar (Pal & Raju, 2007) [5]. **Kalam:** *Kalam* is a popular heat desiccated traditional dairy delicacy of Maharashtra specially Parbhani district. It is prepared by blending of *khoa* and sugar followed by heat desiccation until characteristic light brown colour appears. It is a nutritive, palatable and a very good source of energy. (Ghorpade, 2011) [2].

Consumer response of low-calories and low-sugar *kablam*
The actual consumer response to a newly developed low-calories and low sugar *Kalam*. In order to elucidate the acceptability of finished product it was necessary to expose it to the fairly large number of consumers and seek their opinion about the product. A fresh lot of low-calories and low-sugar *kalam* was prepared for consumer acceptability. The developed *kalam* was tasted by 100 consumers to know their response. The consumers were picked-up randomly under different age, sex and health groups. A questionnaire was provided to the consumers along with the developed *Kalam*.

Material and Methods
Low-calories and low sugar *kalam* was prepared in the Department of Animal Husbandry & Dairy science, Latur.
Buffalo Milk:-Buffalo Milk was standardized to 3 % fat & 9 % SNF.
Artificial sweetener: -Artificial sweeteners i.e. Aspartame was purchased from College of Agriculture, Latur.
Sugar: Good quality sugar was obtained from the local market of Latur.

Bulking agents: High quality bulking agents i.e. Maltodextrin was purchased from College of Agriculture, Latur.

Statistical analysis

All the data were expressed as mean ± standard deviation of mean and was calculated from three independent experiments. One-way analysis of variance (ANOVA) using Completely Randomized Design (CRD) was applied.

Results and Discussion

Table 1: Overall frequency distribution of consumer's acceptability of the Low-Calories and low- sugar *Kalam.*

Acceptability	Number of consumers	Percent (%)
Liked extremely-9	33	33
Liked very much-8	43	43
Liked moderately-7	21	21
Liked slightly-6	03	03
Total	100	100

From the table (1) the overall frequency distribution of consumer's acceptability trial revealed that out of 100 consumers (100%), 33 consumers (33 %) rated as liked extremely, whereas 43 (43%),21 (21 %) and 03 (03 %) consumers rated the product as, liked very much, liked moderately and liked slightly respectively. Over 75% consumers rated the product liked extremely and liked very much acceptability score. None of the consumers rated the product below the acceptable score i.e. 6.0.

Table 2: Frequency distribution of consumer's acceptability of the Low-calories and low-sugar *kalam* on the basis sex group

Acceptability	Male	Percent (%)	Female	Percent (%)
Liked extremely-9	20	20	13	13
Liked very much-8	26	26	17	17
Liked moderately-7	13	13	08	08
Liked slightly-6	02	02	01	01
Total	61	61	39	39

Table (2) shows that the frequency distribution of consumer's acceptability of the Low-calories and low-sugar and *Kalam* on the basis sex group. Out of 100 consumers the finished product was offered to 61 males (61 %) and 39 females (39%). Among the male consumers 20 (20 %) rated as liked extremely whereas the 26 (26%) and 13 (13%) rated the product as, liked very much and liked moderately respectively. Only 2 (2%) male consumers rated the product as liked slightly. Among the female consumers 13 (13 %) rated the product as liked extremely whereas the 17 (17%) and 8 (8%) female consumers rated the product as, liked very much and liked moderately respectively. Only 1 (1 %) female consumers rated the product as liked slightly.

Table 3: Frequency distribution of consumer's acceptability of the Low-calories and Low-sugar *Kalam* on the basis of different age groups (Years)

Acceptability	Age groups (Years)							
	Below 20	Per cent (%)	20-40	Percent (%)	40-60	Percent (%)	Above 60	Percent (%)
Liked extremely-9	02	02	12	12	12	12	07	07
Liked very much-8	06	06	22	22	11	11	04	04
Liked moderately-7	08	08	07	07	04	04	02	02
Liked slightly-6	00	00	02	02	01	01	00	00
Total	16	16	44	44	08	08	13	13

Table (3) shows that the frequency distribution of consumer's acceptability of the Low-calories and low-sugar *kalam* on the basis of different age groups (years). Out of 100 consumers the finished product was offered to 16 consumers (16 %) below the 20 years age groups, 43 (43 %) age group between 20 to 40 years, 28 (28 %) age group between 40 to 60 years and 13 (13 %) age group above 60 years. Among the below 20 years age groups only one consumer 02 (2%) rated the product liked extremely whereas the 06 (06%) and 08 (0.8%) rated the product. Among the age group of 20 to 40 years,12 consumers (12 %) rated the product liked extremely whereas the 22 (22%) and 07 (7%) rated the product as, liked very much and liked moderately respectively. and only 02 (2%) consumers rated the product as liked slightly. Among the age group of 40 to 60 years 12 consumers (12%) rated the product liked extremely whereas the 11 (11%) and 04 (4%) rated the product as, liked very much and liked moderately respectively. and only one consumer (1%) rated the product as liked slightly. Among the above 60 years age groups 07 (7 %) consumers rated the product liked extremely whereas the 04 (4%) and 02 (2%) rated the product as, liked very much. It is concluded that the product is very much liked by the consumers above the age group of above 20 years as compared to consumers of the age group of below 20 years.

Table 4: Frequency distribution of consumer's acceptability of the Low-calories and low-sugar *Kalam* on the basis health group

Acceptability	Normal	Per cent (%)	Diabetic	Percent (%)	Heart disease	Percent (%)	Obese	Percent (%)
Liked extremely	04	04	10	10	8	08	11	11
Liked very much	21	21	14	14	3	03	4	04
Liked moderately	15	15	02	02	0	00	02	02
Liked slightly	08	08	0	00	1	01	0	0.0
Total	45	45	25	25	11	11	19	19

Table (4) shows that the frequency distribution of consumer's acceptability of the Low-calories and low-sugar *Kalam* on the basis of different health groups. Out of 100 consumers the finished product was offered to 45 consumers (45 %) of normal health group, 25 (25 %) diabetics group, 11 (11 %) consumers suffering from heart disease and 19 (19 %) obese group. Among the normal health group out of 45 consumers,04 (04 %) rated the product liked extremely whereas the 21 (21%) and 15 (15%) rated the product as, liked very much and liked moderately respectively. and only 08 (8%) consumers rated the product as liked slightly. Among the diabetic group 10 consumers (10%) rated the product

liked extremely whereas the 14 (14%) and 02 (02%) rated the product as, liked very much and liked moderately respectively. None of the consumer from diabetic group rated the product as liked slightly. Among the consumers suffering from heart disease, 08 consumers (8%) rated the product liked extremely whereas the 03 (3%) and 01 (1%) rated the product as, liked very much and liked slightly respectively and none of the consumers from heart disease rated the product as. liked moderately. Among the obese groups 11 (11 %) consumers rated the product liked extremely whereas the 04 (4%) and 02 (2%) rated the product as, liked very much and liked moderately respectively. None of the consumers from obese group rated the product as liked slightly. It is concluded that out of 62 (100 %) consumers suffering from diabetic, heart diseases and obesity, 58 (58%) consumers liked the product extremely and very much.

Conclusion

The finished product was offered to 100 consumers, the overall frequency distribution of consumer's acceptability trial reveals that out of consumers 33 (33 %) rated as liked extremely, whereas 43 (43 %), 21 (21 %) and 03 (03 %) consumers rated the product as, liked very much, liked moderately and liked slightly respectively. Over 33 % consumers rated the product liked extremely and liked very much acceptability score. None of the consumers rated the product below the acceptable score i.e. 6.0. It is concluded that the product is very much liked by the consumers above the age group of above 20 years as compared to consumers of the age group of below 20 years. On the basis of different health groups, out of 100, Among the normal health group out of 04 (04), 21 (21%) and 15 (15%) rated the product as, liked very much and liked moderately respectively. and only 08 (08%) consumers rated the product as liked slightly. 45 consumers among the groups of peoples suffering from various health problems, 25% diabetic consumers rated the product as, liked very much. None of the consumer from diabetic group rated the product as liked slightly. Among the consumers suffering from heart disease 12% rated the product liked extremely. Among the obese groups 16% consumers rated the product liked. None of the consumers from obese group rated the product as liked slightly. It is concluded that out of 25 (25 %) consumers suffering from diabetic, heart diseases and obesity, 30 (30%) consumers liked the product extremely and very much.

From consumer response trial, it is quite logical to conclude that the Low-calories and low-sugar *kalam* received wide acceptance by all group of consumers specially those consumers suffering from various diseases like diabetes, obesity and heart related problems. It is believed that the product surely shall attract a very wide market acceptance.

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