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Comparative Studies of Physical Qualities of Singori (A Type of Sweet) Of Kumaon

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Abstract: *The study was initiated to compare market and laboratory made singori with objective of providing scientifically proven best quality of said sweet. Singori of Almora was rated paramount as per results obtained with regard to physical quality. Singori collected from the markets indicates that either the samples were quite old or have been prepared under unhygienic conditions due to breakdown of its ingredients decoration has occurred.*

I. Introduction

Singori is an exquisite cuisine of Kumaonis, a community inhabiting the region of Kumaon in the north-eastern section of the state of Uttarakhand. Singori has white color, sweet caramel flavor, slightly granular in texture and is rolled in malu leaves. It is prepared from khoa made by desiccation of cow or buffalo milk, addition of sugar, tartaric acid for granulation and flavourings. Malu (*Bauhinia vahlii*) belongs to the family Leguminosae. It is a giant size climber of perennial nature and is propagated by seeds. Study underhand compares the physical quality of singori of Pantnagar, Rudrapur, Haldwani and Almora cities of Uttarakhand. Almora is being considered as the place of origin for singori to know customary process of singori production and then physical qulity was copared.

II. Material and Methods

The production of singori was limited to only local halwais/sweetmeat makers. To acquire basic information about the process of making singori survey was conducted as per schedule given in Table-1. Samples of singori were also collected from the Halwais in cardboard boxes and were analyzed for proximate composition. The singori samples were evaluated for their sensory characteristics namely color and appearance, flavor and taste, body and texture and overall acceptability using semi-trained panel comprising of 10 panelists drawn from faculty members and post graduate scholars of Department of Food Science and Technology, College of Agriculture, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttaranchal. The panelists were asked to record their observations on the sensory sheet based on 9 point hedonic scale. The sensory score card is given in Appendix-II.

The textural characteristics was measured using double bite compression and was developed to imitate the compression action of molar teeth during food mastication with the help of Texture analyzer (**Suresh, and Jha, 1994).**

Khoa containing nearly 8 to 10 per cent moisture was used for the manufacture of singori with total solids content standardized to approximately 60 percent using whole cow or buffalo milk. Normally pindi type of khoa is used for singori manufacture. Approximately 30 to 40 per cent cane sugar (w/w) was added at 60 to 65°C. A small amount of tartaric acid (0.1 percent) was added to create. The product then used to filled in the greased (preferably with sesame oil) moulds or trays while still hot, allowed to set for 20-30 minutes and then khoa obtained used to be filled in triangular shaped mallu leaves.

III. Result and Discussion

The samples obtained from four town areas of Kumaun region of Uttarakhand state namely, Pantnagar, Rudrapur, Haldwani and Almora were analyzed for physical qualities such as hardness, adhesiveness, gumminess, chewiness and cohesiveness. Results obtained are presented in Table 2.

It is evident from the data presented in table 2 that lowest value of 176.0±0.71, 21.6±2.51, 73.6±1.03, 90.2±0.58, 0.63±0.01 was found for hardness, adhesiveness, gumminess, chewiness and cohesiveness respectively for control 1 and value of these physical properties remain highest and comparable as 191.4±0.68, 40.2±0.73, 87.6±1.51, 94.2±1.46, 0.81±0.03,respectively, were found in samples of Almora and 191.4±132, 31.0±0.71, 86.20.86, 96.0±0.70 and 0.69±0.01 for samples of Rudrapur, market for hardness, adhesiveness, gumminess, chewiness and cohesiveness. The overall samples showed the hardness, adhesiveness, gumminess, chewiness and cohesiveness as 186.1±1.12, 33.4±1.53, 83.1±1.10, 95.8±0.75, 0.71±0.01, respectively**.** The analysis of variance table revealed that the difference in hardness, adhesiveness, gumminess, chewiness and

cohesiveness was statistically significant ($p \leq 0.01$) better for control 1 than all singori samples from different markets as also observed by **Chetna *et al.* (2010) and Prasaad *et al.* (2012)** .

It is obvious from the data presented in table 3 that lowest values of 7.9±0.10 6,6±0.38, , 6,90±0.41 , 6.3±0.15 was found for Rudrapur samples as lowest. Samples of Haldwani were also comparable. However, highest values of 8.6±0.05, 8.8±0.02, 7.80±0.22, 8.4±0.17, respectively, were found in samples of Control 1 and comparable to samples of control 2 showed for colour, flavor, body and texture and overall acceptability. The overall samples showed the 8.3±0.06, 7.9±0.17, 7.40±0.13, 7.5±0.17 values for colour, flavor, body and texture and overall acceptability. The analysis of variance table revealed that the difference in coiour, flavor, body and texture, overall acceptability was non significant in close agreement with **Praneeta (2005)** on Rasogolla made by khoa.

IV. Conclusion

Market and laboratory made singori was compared with intention of providing best quality. Singori of Almora was rated paramount as per results obtained with regard to physico-chemical quality based on breakdown of lactose, protein, titratable acidity, soluble nitrogen content and FFA content and pH.

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Table-1: survey data of singori manufacture

S.No.	Items	Description
1.	Ingredients used	(i) Cow milk/buffalo milk/ combination thereof/pindi khoa (ii) Cane sugar (iii) Tartaric acid/ citric acid (iv) Mallu leaves
2.	Container used	Iron karahi
3.	Amount of milk used in one batch	50±10 liters
4.	Fat % of milk	4-7%
5.	Total solids in desiccated milk/khoa	60% (approximate)
6.	Quantity of singori prepared in one batch	10±2 Kg
7.	Amount of sugar added	30-40% (W/W)
8.	Temperature at the time of sugar addition	60-75 ^{0}C
9.	Coagulants added	(i) Tartaric acid (0.1 W/W) (ii) Citric acid (0.1 W/W)
10.	Temperature of coagulant addition	70-75 ^{0}C
11.	Temperature of desiccation	104-105 ^{0}C
12.	Moisture content at the end of desiccation	9–11%
13.	Judgment of end point of desiccation	(i) Desired texture and colour of product (ii) Moisture content in product
14.	Working and cooling	Done with the help of wooden khunti after removing karahi from fire till the temperature reached approximate 70 ^{0}C
15.	Flavouring agent used	Keora water
16.	Amount of flavouring agent used	0.01% approx.
17.	Setting of khoa	Contents are transferred to greased and leveled with the khunti
18.	Greasing material for mould	(i) Refined vegetable oil
19.	Time of setting	20-30 minutes
20.	Weight of pieces	50-75 g (approximate)
21.	Wrapper	Mallu leaves
22.	Packaging	Cardboard boxes
23.	Temperature of storage	(i) Room temperature (common) (ii) Refrigeration temperature
24.	Shelf life	
	(i) Room temperature (common)	<7 day
	(ii) Refrigeration temperature	<15 days
25.	Uniqueness of singori	Traditional sweet liked by tourist

1. Total solid content in khoa is adjusted by adding whole milk.
2. Tartaric acid and citric acid were added after dissolving in small amount of water.

3. For maintaining the desiccation temperature (104-105 ^{0}C) small amount of water is sprinkled which also facilitates scrapping of content from the side of the container and avoiding burnt particles in the product.
4. Keora water is preferred due to its flavor
5. At refrigeration temperature singori became soggy.

Table 2: Physical qualities of market and control of samples of singori

Places	Physical quality of singori				
	Hardness	**Adhesiveness**	**Gumminess**	**Chewiness**	**Cohesiveness**
Pantnagar	187.8±0.269	41.8±1.39	88.0±0.54	97.0±0.69	0.65±0.02
Rudrapur	191.4±132	31.0±0.71	86.20.86	96.0±0.70	0.69±0.01
Haldwani	184.4±1.69	40.6±0.60	83.8±0.58	96,2±0.86	0.74±0.01
Almora	191.4±0.68	40.2±0.73	87.6±1.51	94.2±1.46	0.81±0.03
Control-1	176.0±0.71	21.6±2.51	73.6±1.03	90.2±0.58	0.63±0.01
Control-2	186.0±0.71	25.6±2.25	79.6±0.35	101.0±,2.28	0.75±0.04
Overall	**186.1±1.12**	**33.4±1.53**	**83.1±1.10**	**95.8±0.75**	**0.71±0.01**

Table 3: Sensory qualities of market and control of samples of singori

Places	**Sensory (Mea±Sem)**			
	Colour	**Flavour**	**B. & Text**	**Overall**
Pantnagar	8.0±0.06	7.2±0.37	7.30±0.38	7.7±0.62
Rudrapur	7.9±0.10	6,6±0.38	6,90±0.41	6.3±0.15
Haldwani	7.9±0.08	7.8±0.21	7.20±0.37	7.5±0.31
Almora	8.5±0.03	8.1±0.15	7.80±0.22	6.9±0.52
Control-1	8.6±0.05	8.7±0.06	7.80±0.22	8.4±0.17
Control-2	8.6±0.05	8.8±0.02	7.40±0.28	8.40.17
Overall	**8.3±0.06**	**7.9±0.17**	**7.40±0.13**	**7.5±0.17**