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## Studies on sensory qualities of *basundi* stored under retort packaging

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### Abstract

In this investigation attempts were made to evaluate the sensory qualities of *basundi* under retort packaging. The Retort processed *basundi* samples were compared with the non-retort processed *basundi* stored at 37 °C and 5 °C for about 35 days and observed the different sensory qualities of product at 5 days interval. The significant differences were observed during storage of *basundi* for sensory qualities. The sample preserved at 37 °C awarded with the highest sensory score than the product stored at 5 °C because the *basundi* stored at low temperature may leads to sugar separation and also increases the viscosity of the product. In comparison with the non-retort processed treatments, the retort processed treatments showed the higher sensory score up to 35<sup>th</sup> day of storage. Hence, the product without retort processing and stored at 37 °C showed the rapid declined in sensory score and product got spoiled thereafter.

**Keywords:** *Basundi*, sensory evaluation, retort packaging, shelf life

### Introduction

*Basundi* is one of the heat desiccated indigenous dairy product, popular in western part of India, mostly in Maharashtra and Gujarat. The market value of product depends upon a relative creamy consistency, white to light brown colour, sweetish caramel aroma and soft textured flakes uniformly distributed throughout the product mass (Patange *et al.*, 2006) <sup>[12]</sup>. It has high nutritive and food value owing to the concentration of milk to 2 to 2.5 fold and presence of sugar at high level. Sugar serves as a preservative apart from adding to the rich taste of *basundi*. Traditionally *basundi* is prepared from buffalo milk which is concentrated along with the scrapping and agitating, to about 2 fold by slow boiling in open kettle. Sugar at the rate of 6 to 7 per cent of milk added at the last stage of concentration followed by optional addition of flavours and nuts. The product is cooled and served chilled (Pal and Raju, 2007) <sup>[11]</sup>. The in-packet sterilization can be archived in cans, jars, tubs and pouches. Sterilization of food is differing than that of retort packaging. Retort packaging may be defined as a process for preservation of a food in which food is sealed before cooking for long-term un-refrigerated storage. This packaging has largely influence on the shelf life of food products (Rodriguez *et al.*, 2002) <sup>[14]</sup>.

### Material and Methods

#### Material

Buffalo milk was obtained from Dairy farm, RSCM College of Agriculture, Kolhapur. Cane sugar was procured from local market of Kolhapur city. An iron karahi used for preparation of *basundi*. Stirrer used for stirring-cum scrapping the milk during preparation of *basundi*. L.P.G. gas was used as heating media. Cream separator was used for separation of cream and skim milk for standardization. Retort pouch procured from Modern Scientific Store, Karnal, Haryana. All glasswares used were of Borosil make for analytical work. Electronic weighing balance capacity 3000 g was used for weighing during the course of investigation. Refrigerator used to kept samples. Sealing machine used for sealing the pouches. Autoclave used to sterilize the pouch (retorting).

### Methodology

*Basundi* was prepared as per the procedure, given by Aneja *et al.* (2002) <sup>[2]</sup>. Initially buffalo milk was standardized to 6 per cent fat by Pearson square method (De, 1980) <sup>[3]</sup>. The standardized milk was then allowed to boil in Karahi. During boiling milk was continuously stirred and scrapped to avoid burning till the concentration reaches to 2:1. Followed by addition of sugar, which was 6 per cent of milk taken.

The heating was continued for few minutes. Prepared *basundi* was allowed to cool down at room temperature. Prepared *Basundi* was hot filled to around 100 ml in retortable pouches using funnel. The pouches were sealed properly using a sealing machine with 3 mm seal width. The air tight sealed retortable pouches was kept in autoclave at 121 °C for 15 min. These sealed pouches were retorted in autoclave at 121 °C for 15 min. and stored as per treatments and compared with non-retorting.

#### The treatments were as follows

**T<sub>1</sub>:** *Basundi* stored at refrigerated temperature without retort packaging.

**T<sub>2</sub>:** *Basundi* stored at refrigerated temperature with retort packaging.

**T<sub>3</sub>:** *Basundi* stored at room temperature without retort packaging.

**T<sub>4</sub>:** *Basundi* stored at room temperature with retort packaging. Each sample of *basundi* was evaluated further to sensory analysis at 5 days interval during storage.

#### Analytical methods

##### Sensory evaluation

The product for sensory characteristics *viz.* Colour and appearance, flavour, body and texture and consistency was evaluated by semi trained panel of judges from the staff of College of Agriculture, Kolhapur by using 9 points hedonic scale as per Amerine *et al.* (1965)<sup>[1]</sup>.

##### Statistical analysis

The research data analyzed in respect of Completely Randomized Design (CRD) with equal replications (Snedecor and Cochran, 1994)<sup>[15]</sup>. Replications – Five Treatment – Four.

#### Results and Discussion

##### Changes in sensory qualities of retort processed *basundi* during storage

The retort and non retort processed *basundi* stored at room and refrigeration temperature, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> were analyze for organoleptic qualities, including colour and appearance, flavour, body and texture, consistency and overall acceptability. The results for organoleptic qualities of *basundi* are discussed as under.

##### Colour and appearance

The score for colour and appearance was recorded in an around (score 8.0) indicated that, the product 'liked very much' by panel of judges. On the 5<sup>th</sup> day of storage the effect of treatments was found significant ( $p < 0.05\%$ ). Initially the samples T<sub>2</sub> and T<sub>4</sub> awarded with the lower score than the sample T<sub>1</sub>. It might be due to millards reaction taking place between protein and sugar at elevated processing temperature, as reported by Gandhi (1990)<sup>[7]</sup>. The lowest score was recorded to T<sub>3</sub> (score 4.89) and this score was 'disliked slightly' on 9 point hedonic scale. On 5<sup>th</sup> day the deterioration in the colour and appearance score of T<sub>3</sub> might be due to occurrence of few mould growth and product showed too coagulated appearance leads to spoilage, therefore sample T<sub>3</sub> was discontinued from the study from 5<sup>th</sup> day onwards, indicating the T<sub>3</sub> sample may stable for 2 to 3 days of storage. Similar results were obtained by Gaikwad and Hembade (2012)<sup>[6]</sup> during storage study of *basundi*. The samples treated with the treatments T<sub>1</sub> and T<sub>2</sub> showed minimal acceptable

score only up to 15<sup>th</sup> day and 30<sup>th</sup> day of storage, respectively. However, sample T<sub>4</sub> was recorded 6.85 score at the end of study period. This variation might be due to occurrence of millard reaction resulted in pronounce brown colour in the product during storage similar finding was observed by Prasad *et al.* (1989)<sup>[13]</sup>.

##### Effect on flavour

The effect of packaging process and storage temperature were significant ( $P < 0.05$ ) during storage. The score showed decreasing trend during storage. On the very first day of storage all the samples were 'liked very much' by panel of judges. However, on 9 point hedonic scale, the samples T<sub>2</sub> and T<sub>4</sub> showed comparatively lower score on the same day, might be due to higher thermal processing leads to develop cooked flavour in the product. After the interval of 5 days the maximum score was recorded for the sample processed under T<sub>1</sub> (score 7.98) and lowest score obtained by T<sub>3</sub> (score 4.88) which was 'disliked slightly' by the panel. The sample preserved under T<sub>1</sub> remained acceptable only up to 15<sup>th</sup> day of storage. The T<sub>2</sub> and T<sub>4</sub> retort processed *basundi* were recorded 6.60 and 6.32 flavour score respectively on 35<sup>th</sup> day of storage. The significant decreased in flavour score was observed in T<sub>4</sub> sample might be due to proteolysis leads to development off flavour in sterilized product during storage at room temperature. These finding are in accordance with the scientific report of Mckellar (1981)<sup>[10]</sup>.

##### Body and Texture

The significant ( $P < 0.05\%$ ) reduced in body and texture score was observed from 5<sup>th</sup> day onwards. On 5<sup>th</sup> day of storage sample T<sub>3</sub> had drastically declined in the score up to 4.03 which were 'dislike moderately' on 9 point hedonic scale. This sudden declined in score might be due to microbial growth in the product. Similarly, because of low temperature during storage the product preserved under treatment T<sub>1</sub> were found within acceptable limit 'liked slightly' up to 15<sup>th</sup> day of storage, However T<sub>1</sub> product does not involve sterilization process resulted in growth of microbes which was shown pronounced change in body and texture on 20<sup>th</sup> days of storage. In the samples T<sub>2</sub> and T<sub>4</sub> there was gradual declined in the score were observed and found within acceptable limit 'liked slightly' up to 30<sup>th</sup> day and 35<sup>th</sup> day of storage respectively. There was significant ( $P < 0.05\%$ ) difference in body and texture score was observed between T<sub>2</sub> and T<sub>4</sub> during each period of storage. It was observed that, more texture related changes took place at 5°C than at 37°C. Similar finding was observed in storage study of *kunda* by Mahalingaiah *et al.* (2008)<sup>[9]</sup>.

##### Consistency

The gradual reduction in the consistency score were observed in sample T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> during storage period this might be due to occurrence of microbial growth. The sample T<sub>1</sub> showed consistency score within the limits of acceptability 'like slightly' on 15<sup>th</sup> day of storage, it was neither like to nor dislike (score 5.10) on 20<sup>th</sup> day of storage, similar finding were reported by Gaikwad and Hembade (2011)<sup>[5]</sup> for *ujani basundi* stored under refrigeration temperature. Product under T<sub>2</sub> and T<sub>4</sub> were acceptably score up to 30<sup>th</sup> and 35<sup>th</sup> day of storage, respectively. It was observed that the change in consistency score was comparatively faster in retort *basundi* stored at lower temperature (score from 7.98 to 5.00) than

stored at higher temperature (score from 7.98 to 7.00) on 35<sup>th</sup> day of storage. Kalyankar *et al.* (2016) [81] reported a significant effect of storage period and temperature on the consistency score of condensed milk. Commonly the consistency score reduces due to increase in the consistency of the product and this was because of hydrolysis of protein and increase in soluble solids during storage as reported by Fennema (1996) [4].

### Overall acceptability

The overall acceptability score of T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> were declined sharply 8.0, 7.80, 8.0 and 7.80 on 0 day of storage respectively. The score for overall acceptability of sample T<sub>3</sub> was 4.15 'disliked slightly' on 5<sup>th</sup> day of storage. This was might be due to occurrence of microbial growth in the product as a result sample was discarded from the study. It was also pointed out that on 5<sup>th</sup> day the T<sub>4</sub> sample was recorded

maximum score (7.86) over rest of the treatments under study. For T<sub>1</sub> treatment the average score dropped to 4.64 on 20<sup>th</sup> day of storage and subsequently the sample was rejected due to visual observance of yeast and mould growth on the product surface. Sample preserved under T<sub>2</sub> were acceptably up to 30<sup>th</sup> day of storage, the average score for overall acceptability were 7.80, 7.72, 7.65, 7.55, 7.12, 6.55 and 6.10 on 0, 5, 10, 15, 37 20, 25 and 30<sup>th</sup> day of storage period, respectively. The average score for overall acceptability were found to be 7.80, 7.75, 7.70, 7.65, 7.55, 7.10, 6.66 and 6.23 for the *basundi* preserved under T<sub>4</sub> on 0, 5, 10, 15, 20, 25, 30 and 35<sup>th</sup> day of storage respectively. Statistically the effect of different treatments on overall acceptability of the *basundi* was found to be significant ( $p < 0.05\%$ ). Probably, this was caused by textural changes taking place during storage. Kalyankar *et al.* (2016) [81].

**Table 1:** Sensory score\* obtained in retort processed *basundi* stored under room temperature during storage period.

Sensory attributes	Storage period (Days)								
	0	5	10	15	20	25	30	35	40
Colour and Appearance	7.97 ±0.03	7.71 ±0.03	7.63 ±0.03	7.60 ±0.02	7.54 ±0.04	7.43 ±0.03	7.17 ±0.03	7.00 ±0.04	6.85 ±0.01
Flavour	7.95 ±0.03	7.90 ±0.03	7.66 ±0.04	7.47 ±0.03	7.30 ±0.03	7.08 ±0.03	6.59 ±0.03	6.32 ±0.02	5.12 ±0.04
Body and Texture	8.03 ±0.04	7.95 ±0.04	7.88 ±0.04	7.79 ±0.01	7.70 ±0.04	7.56 ±0.04	7.31 ±0.03	7.20 ±0.03	7.15 ±0.03
Consistency	7.98 ±0.04	7.88 ±0.03	7.67 ±0.03	7.40 ±0.04	7.20 ±0.04	7.10 ±0.04	7.05 ±0.03	7.00 ±0.03	6.85 ±0.03
Overall acceptability	7.80 ±0.01	7.75 ±0.03	7.70 ±0.03	7.65 ±0.03	7.55 ±0.03	7.10 ±0.04	6.66 ±0.03	6.23 ±0.03	5.12 ±0.03

(\* mean ± SE of five replications of treatment T<sub>4</sub>)

### Conclusion

The retort processed *basundi* stored at room temperature (37 °C) was found commercially sterile in ready-to-use form up to 35<sup>th</sup> day of storage. The sensory quality of retort processed *basundi* achieved maximum score during storage up to 35<sup>th</sup> day at 37 °C and the score were 7.00, 6.32, 7.20, 7.00 and 6.23 score for colour and appearance, flavour, body and texture, consistency and overall acceptability, respectively.

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