RESEARCH JOURNAL OF ANIMAL HUSBANDRY AND DAIRY SCIENCE (Apr. & Oct., 2011); 2 (1&2) : 1-6

RESEARCH PAPER

Received : Jun., 2011; **Revised:** Jul.. 2011; **Accepted :** Aug., 2011

Studies on sensory and chemical quality of Shrikhand sold in Akola city

ABHIMANYU ARJUN CHOPADE, PRADEEP RAGHOBAJI PARATE, RAHUL VINAYAK PATIL AND SHRISHAIL PANDURANG MEHARKAR

ABSTRACT

The investigation was carried out in the Department of Animal Husbandry and Dairying, Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the year 2008-09. The objectives were to study sensory and chemical quality of Shrikhand as per PFA standards. Shrikhand samples were collected from different manufacturers. Total 18 samples from three different manufacturers were subjected to sensory and chemical evaluation. The experiment was planned under Completely Randomized Design for statistical analysis.

Overall acceptability was determined on the basis of various sensory attributes. The highest score of sensory evaluation *i.e.* 93.25 per cent was recorded in treatment T_1. The highest mean value of fat was found in treatment T_1 *i.e.* 8.15 T_1, followed by 7.68 T_3, 3.93 per cent T_2 . The higher mean value (1.47) of titratable acidity was found in treatment T_1. The higher mean value of protein was found in treatment *i.e.* 7.29, T_1 followed by 6.30 T_3 and 3.56 per cent T_2. The highest mean value of total solid was found in treatment *i.e.* 58.59 T_1, 55.58 T_2 and 47.04 per cent T_3.

KEY WORDS : Shrikhand, Sensory quality, Chemical quality

Chopade, Abhimanyu Arjun, Parate, Pradeep Raghobaji, Patil, Rahul Vinayak and Meharkar, Shrishail Pandurang. (2011). Studies on sensory and chemical quality of Shrikhand sold in Akola city, ***Res. J. Animal Hus. & Dairy Sci.,*** **2** (1&2) : 1-6.

INTRODUCTION

Milk is being a complete food. It is nature's gift to mankind. The role of milk in the traditional diet has varied greatly in different regions of the world. Milk has traditionally been preserved through the means, other than refrigeration by conversion into more stable product such as heat coagulated products like Khoa, Burfi, Paneer and fermented milk products like Shrikhand etc. Chakka, Shrikhand, Dahi, Misti Dahi and Lassi are the fermented indigenous products manufactured and consumed in India.

Shrikhand commonly prepared from Chakka, is base material for making Shrikhand. Besides fresh milk, other products like diluted condensed milk, reconstituted skim milk, buttermilk, skim milk and condensed milk has been used for preparation of Shrikhand. However, quality of Shrikhand obtained from these products is inferior.

The fermented milk products play an important role in human nutrition. It has been well documented due to their strong therapeutic value and preservative potential. Number of fermented milk products like Dahi, Shrikhand, Lassi, Yoghurt, Kumiss, Kefir and cultured milk are prepared and marketed especially during summer. Specially, buffalo milk is preferred for making Shrikhand due to higher yield and better quality of the finishing product obtained from it. That's why it is rich in minerals including calcium, magnesium, phosphorus, copper, iron and zinc compared to cow milk Shrikhand. The composition of this product is 60 per cent total solids, 5 per cent fat, 42 per cent sugar and less than 7 per cent protein (Aneja *et al.*,1978).

Fermented milk product like Shrikhand has some advantages over fluid milk because of more keeping quality, digestibility and palatability, with its distinct taste, richness, delicacy, diversity, fairly longer shelf-life. Hence, an attempt has been made to study the objectives as sensory and chemical quality of Shrikhand sold in Akola city.

Correspondence to:
ABHIMANYU ARJUN CHOPADE, Department of Animal Science and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

Authors' affiliations:
PRADEEP RAGHOBAJI PARATE, RAHUL VINAYAK PATIL, SHRISHAIL PANDURANG MEHARKAR, Department of Animal Science and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri, AHMEDNAGAR (M.S.) INDIA

MATERIALS AND METHODS

The study was undertaken at Department of Animal Husbandry and Dairying, Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidhyapeeth, Akola in the year 2008 - 2009.

Material required:

The study included the preliminary survey of Shrikhand sold in Akola city. The samples of market Shrikhand were collected from three sources :

T_1 Branded shrikhand e.g. Amul, Aarey and Warana which are produced by companies and marketed in Akola city.

T_2 Shrikhand prepared in the milk dairy and marketed in Akola city.

T_3 Shrikhand in loose cup sold in restaurant.

These Shrikhand samples were subjected for evaluation and comparison in respect of chemical and sensory evaluation.

Methods adopted:

Evaluation of market samples:

In all Shrikhand samples were collected from three different manufactures sold in Akola city. These Shrikhand samples were collected from respective manufactures mentioned above in the available size of packaging that is 500 gm in polythene bags or plastic containers. The samples were collected at weekly intervals. All these samples were brought to Post Graduate Laboratory, Animal Husbandry and Dairying Dept., Post Graduate Institute, Dr. Panjabrao Deshmukh Krishi Vidhyapeeth, Akola for chemical analysis.

Collection of shrikhand samples from different manufacturers in Akola city:

Total 18 samples were collected from different manufacturers and marked treatment T_1, T_2 and T_3.

Name of sample	No. of samples analyzed
T_1	6
T_2	6
T_3	6

Thus, total 18 samples were analyzed for chemical analysis

Analytical technique:

Judging the sensory quality of Shrikhand:

The quality of Shrikhand was judged by five judges in each trial. For this Shrikhand samples were offered to them and requested to give their remarks on the quality with the help of score card supplied to them has suggested by Nelson and Trout (1964).

Flavour, Body and texture, Colour and appearance and acidity

Score for judging Shrikhand (Nelson and Trout, 1964).

Name :……..

Date : …… Time :

Sr. No.	Attributes	Perfect score	Sample number 1	2	3	4	5	6
1.	Flavour	45						
2.	Body and texture	30						
3.	Colour and appearance	15						
4.	Acidity	10						
	Total	100						

Chemical analysis of Shrikhand:

Shrikhand prepared using yoghurt and local market dahi culture was subjected for chemical analysis *viz.,* fat, acidity, total solids, moisture, protein, lactose, ash and sucrose.

Experimental Design and Statistical analysis:

The data obtained from sensory and chemical qualities were analyzed by Completely Randomized Design (CRD) with three treatments and six replications. The significant was evaluated on the basis of critical differences within the treatments and so compared for various parameters studied (Panse and Sukhatme, 1978).

RESULTS AND DISCUSSION

The results obtained are presented and discussed under the following heads:

Sensory evaluation of Shrikhand sold in Akola city: Flavour, body and texture, acidity and appearance.

Chemical composition of Shrikhand sold in Akola city: Fat, acidity, protein, lactose, total solids, moisture, ash and sucrose.

The data pertaining to sensory evaluation in respect of flavour, body and texture, acidity and appearance score of Shrikhand sold in Akola city are presented in Table 1-5.

Average flavour score of Shrikhand:

Average flavour score of Shrikhand sold in Akola city is presented in Table 1. It was observed that, the average flavour score of Shrikhand sold in Akola city ranged significantly from 24.68 per cent (T_2) to 43.26 per cent (T_1). The highest flavour score was observed in treatment T_1 *i.e.* 43.26 per cent followed by treatment T_3 *i.e.* 41.29 per cent. The lowest flavour score was found in treatment T_2 *i.e.* 24.68 per cent.

Table 1: Average flavour score of Shrikhand sold in Akola city (score out of 45)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	43.18	43.93	42.83	43.55	43.11	42.97	43.26
T_2	25.82	24.80	23.80	24.50	25.20	24.00	24.68
T_3	40.60	40.22	41.18	41.30	42.22	42.23	41.29
`F' test							Sig.
SE(m)±							0.280
CD at 5%							0.832

Table 2: Average body and texture score of Shrikhand sold in Akola city (score out of 30)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	28.45	28.65	28.24	27.35	27.67	28.20	28.09
T_2	16.60	14.35	15.58	13.38	14.20	14.10	14.70
T_3	26.45	25.95	26.65	25.65	26.3	25.97	26.16
`F' test							Sig.
SE(m)±							0.311
CD at 5%							0.926

Table 3 : Average acidity score of Shrikhand sold in Akola city (score out of 10)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	7.5	7.6	7.8	7.7	7.4	7.3	7.55
T_2	5.2	5.4	5.3	5.0	5.4	5.1	5.24
T_3	6.7	6.8	6.5	6.6	6.9	6.5	6.66
`F' test							Sig.
SE(m)±							0.07
CD at 5 %							0.205

Table 4 : Average appearance score of Shrikhand sold in Akola city (score out of 15)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	13.9	14.6	14.4	14.5	14.7	14.0	14.35
T_2	5.8	6.4	8.0	6.4	6.7	7.0	6.71
T_3	12.4	12.9	13.4	12.2	12.7	13.3	12.81
`F' test							Sig.
SE(m)±							0.222
CD at 5 %							0.660

Table 5 : Average overall acceptability of Shrikhand sold in Akola city (score out of 100)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	93.03	94.78	93.27	93.1	92.88	92.47	93.25
T_2	53.42	50.95	52.60	49.28	51.50	50.20	51.32
T_3	86.15	85.87	87.73	85.75	88.88	88.00	86.94
`F' test							Sig.
SE(m)±							1.328
CD at 5 %							3.945

Average body and texture score of Shrikhand :

Average body and texture score of Shrikhand sold in Akola city is presented in Table 2. The average body and texture score ranged significantly from 14.70 per cent (T_2) to 28.09 (T_1). The highest score for body and texture was found in treatment T_1 *i.e.*28.09 per cent followed by treatment T_3 *i.e.* 26.16 per cent. The lowest score was found in treatment T_2 *i.e.* 14.70 per cent.

Average acidity of Shrikhand :

Average acidity score of Shrikhand sold in Akola city presented in Table 3. It was observed that, the average acidity ranged significantly from 5.24 per cent (T_2) to 7.55 per cent (T_1). However, maximum average acidity was found in treatment T_1 *i.e.* 7.55 per cent followed by T_3 *i.e.* 6.66 per cent. The lowest acidity was observed in treatment T_2 being 5.24 per cent.

Average appearance score of Shrikhand :

Average appearance score of Shrikhand sold in Akola city is presented in Table 4. It was revealed, that the average appearance score of Shrikhand ranged significantly from 6.71 per cent (T_2) to 14.35 per cent (T_1). The maximum average appearance score was found in treatment T_1. The lowest appearance score was found in treatment T_2 *i.e.* 6.71 per cent.

Average overall acceptability of Shrikhand :

Average overall acceptability of Shrikhand sold in Akola city is presented in Table 5. It was observed that, the average overall acceptability ranged from 51.32 per cent (T_2) to 93.25 per cent (T_1). The highest score was recorded in T_1 (93.25 per cent), while lowest score was recorded in treatment T_2 (51.32 per cent). T_1 was found significantly superior over treatment T_3 in respect of overall acceptability.

In the present study, on comparing the various samples of Shrikhand on the basis of sensory evaluation by the judges, T_1 *i.e.* 93.25 per cent was found to be superior.

Chemical composition of Shrikhand sold in Akola city:

Market samples of Shrikhand sold in Akola city were analyzed for fat, acidity, protein, lactose, total solids, moisture, ash and sucrose and the results are presented in Table 6- 13.

Average fat percentage of Shrikhand :

The average fat content of Shrikhand is presented in

Table 6 : Average fat content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	8.06	8.98	8.64	8.10	8.53	8.74	8.50
T_2	3.52	3.77	3.92	4.22	4.18	3.98	3.93
T_3	7.76	7.74	7.67	7.70	7.59	7.63	7.68
`F' test							Sig.
SE(m)±							0.106
CD at 5 %							0.317

Table 7 : Average titratable acidity content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	1.52	1.58	1.37	1.45	1.40	1.52	1.47
T_2	0.96	1.04	1.12	1.05	1.08	1.15	1.06
T_3	1.43	1.47	1.43	1.4	1.48	1.45	1.44
`F' test							Sig.
SE(m)±							0.025
CD at 5 %							0.076

Table 8. Average protein content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	7.01	7.15	7.21	7.37	7.42	7.54	7.29
T_2	4.0	3.83	3.70	3.51	3.25	3.10	3.56
T_3	6.0	6.12	6.22	6.37	6.50	6.61	6.30
`F' test							Sig.
SE(m)±							0.108
CD at 5 %							0.319

Table 9 : Average lactose content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	3.50	3.59	3.46	3.39	3.61	3.69	3.54
T_2	3.34	3.38	3.28	3.16	3.27	3.08	3.25
T_3	1.54	1.61	1.68	1.58	1.75	1.79	1.65
`F' test							Sig.
SE(m)±							0.043
CD at 5 %							0.129

Table 10: Average total solids content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	58.10	58.84	58.88	57.56	59.08	59.11	58.59
T_2	54.83	56.7	57.45	55.94	56.65	53.75	55.88
T_3	49.78	47.1	46.32	46.12	46.21	46.75	47.04
`F' test							Sig.
SE(m)±							0.482
CD at 5 %							1.432

Table 11: Average moisture content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	41.90	41.16	41.12	42.44	40.92	40.89	41.40
T_2	45.17	43.30	42.55	44.36	43.35	46.25	44.16
T_3	50.22	52.90	53.68	53.88	53.79	53.25	52.95
`F' test							Sig.
SE(m)±							0.483
CD at 5 %							1.434

Table 12 : Average ash content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	0.81	0.83	0.81	0.85	0.79	0.82	0.81
T_2	0.75	0.76	0.77	0.75	0.79	0.78	0.76
T_3	0.50	0.51	0.53	0.55	0.52	0.54	0.52
`F' test							Sig.
SE(m)±							0.007
CD at 5 %							0.021

Table 13 : Average sucrose content of Shrikhand sold in Akola city (per cent)

Treatments	Replications						Mean
	I	II	III	IV	V	VI	
T_1	38.72	38.29	38.76	37.85	38.73	38.32	38.44
T_2	43.02	44.96	45.78	4430	45.16	42.81	44.33
T_3	33.98	31.12	30.22	29.92	29.85	30.18	30.87
`F' test							Sig.
SE(m)±							0.476
CD at 5 %							1.415

Table 6. The average fat content ranged from 3.93 per cent (T_2) to 8.50 per cent (T_1). The average maximum fat content of treatment T1 *i.e.* 8.50 per cent found to be significantly superior over treatment T_3 *i.e.* 7.68 per cent. The fat content of T_1 and T_3 treatments were found comparable to PFA standard.

The result obtained in the present investigation for the fat content in Shrikhand sold in Akola city was found to be in close agreement with the result reported by Sharma *et al.* (1975) and Ghodekar *et al.* (1982), who reported that, the average fat content in Shrikhand was in the range of 1.04 to 11.66 per cent which are supportive to the present investigation.

Average titratable acidity content of Shrikhand:

Average titratable acidity content of Shrikhand is tabulated in Table 7. The average titratable acidity content ranged from 1.06 per cent (T_2) to 1.47 per cent (T_1) lactic acid. The average maximum acidity content of treatment

T_1 (1.47 per cent) was significantly superior over treatment T_3 *i.e.* 1.44 per cent. On comparing the titratable acidity, the acidity of T_1 and T_3 treatments were found comparable to PFA standards.

More or less similar trends in the values of titratable acidity were noticed by Sharma *et al*. (1975) and Sharma and Zariwala (1980), who reported that, acidity of Shrikhand was in the range of 1.38 to 2.27 per cent.

Average protein content of Shrikhand :

The average protein content of Shrikhand is presented in Table 8. The average protein content ranged from 3.56 per cent (T_2) to 7.29 per cent (T_1). The average maximum protein content was found in treatment T_1 *i.e.* 7.29 per cent significantly superior over treatment T_3 *i.e.* 6.30 per cent. The lowest protein content was found in treatment T_2 *i.e.* 3.56 per cent. The protein content of T_1 and T_3 treatments were found comparable to PFA standards.

These results are in close agreement with the results of Upadhyay *et al*. (1975), Sharma *et al*. (1975) and Ghatak and Dutta (1998).

Average lactose content of Shrikhand :

The average lactose content of Shrikhand is tabulated in Table 9. The average lactose content ranged from 1.65 per cent (T_3) to 3.54 per cent (T_1). The average maximum lactose content was found in treatment T_1 (3.54 per cent). The significantly lowest lactose content was observed in T_3 (1.65 per cent). Sharma *et al*. (1975) reported that, the average lactose content was in the range of market sample 0.83 to 4.70 per cent.

Average total solids content of Shrikhand :

Average total solids content of Shrikhand is presented in Table 10. The average total solids content ranged from 47.04 per cent (T_3) to 58.59 per cent (T_1). The average maximum total solids content was found in treatment T_1 (58.59 per cent) which was significantly superior over treatment T_2 (55.88 per cent). The lowest total solids were found in treatment T_3 *i.e.* 47.04 per cent. The total solids content of T_1 and T_2 treatments were observed to be comparable to PFA standards.

The results were corroborating with the findings of Bhattacharya *et al*.(1972), Aneja *et al*. (1978),Patel and Abd-el-Salem (1986) and Subramanian *et al*.(1995), who reported, the average total solids in the range of 40 to 60 per cent.

Average moisture content of Shrikhand :

The average moisture content of Shrikhand is presented in Table 11. The average moisture content ranged from 41.40 per cent (T_1) to 52.95 per cent (T_3). Ttreatment (T_3) was having higher moisture content. The lowest moisture was observed in treatment T_1 *i.e.* 41.40 per cent.

More or less similar trend in the values of moisture was noticed by Kuila *et al*. (1975), Bhattacharya *et al*. (1972), Sharma *et al*. (1975), Ghodekar *et al*. (1982) and Anonymous, (1997). They reported the moisture content of Shrikhand in the range of 24 to 60 per cent.

Average ash content of Shrikhand :

The average ash content of Shrikhand is recorded in Table 12. The average ash content ranged from 0.52 per cent (T_3) to 0.81 per cent (T_1). The average maximum ash content was recorded in treatment T_1 (0.81 per cent) and was significantly superior over treatment T_2 *i.e.* 0.76 per cent. While the minimum ash content was found in treatment T_3 *i.e.* 0.52 per cent. The ash content of treatment T_1 was closely in agreement with the PFA standards.

Similar observations were also recorded by Sharma *et al*. (1975), De (1994), Anonymous, (1997) and Boghra and Mathur (2000). The findings of present investigation are as comparable to the results of these research workers, who reported the ash content of Shrikhand in the range of 0.2 to 0.8 per cent.

Average sucrose content of Shrikhand :

Average sucrose content of Shrikhand is presented in Table 13. The average sucrose content ranged significantly from 30.87 per cent (T_3) to 44.33 per cent (T_2). The significantly maximum sucrose content was observed in treatment T_2 *i.e.* 44.33 per cent followed by treatment T_1 *i.e.* 38.44 per cent. The lowest sucrose content was observed in the treatment T_3 *i.e.* 30.87 per cent. In the present study, none of the treatments was found comparable to the sucrose content of PFA standards *i.e.*72.5 per cent.

Similar type of observations were also recorded by Sharma *et al*. (1975), Laxminarayanan and Shankar (1980), Patel and Abd-el-Salem (1986) and Anonymous (1997), who observed the sucrose between the ranges of 39.70 per cent to 52.99 per cent.

Conclusions:

Sensory quality of branded Shrikhand sold in Akola city was found to be excellent having 93.25 per cent overall acceptability score and showed clean, pleasant, acid flavour, while Shrikhand sold by other manufactures in Akola city

was fair in sensory quality. Chemical quality of Shrikhand sold in Akola city was found to be good and was observed nearer to PFA standards.

LITERATURE CITED

Aneja, R.P., Vyas, M.N., Nanda Karan and Thareja, V.K. (1978). Development of an industrial process for the manufacture of Shrikhand. *Dairy Sci. Abstr.,* **40**:499.

Anonymous, (1997). Preparation of chakka for shrikhand making. *Dairy India*, 388.

Bhattacharya, D.C., Mathur, O.N., Tiwari, B.D. and Bhalchandra, R. (1972). Studies on the method of production of Shrikhand. A report on the research activities of the NDRI, Karnal (Hayana) and its regional stations , Banglore and Kalyani, 153 PP.

Boghra, V.R. and Mathur, O.N. (2000). Physico-chemical status of major milk constituents and minerals at various stages of Shrikhand preparation. *J. Food Sci.Tech.*, **37**(2):111-115.

De, S. (1994). Chemical composition of Shrikhand *Outline of Dairy Technology*, 12th Ed. Oxford University Press, New Delhi,pp.404-412.

Ghatak, P.K. and Dutta, S. (1998). Effect of admixing of cow and buffalo milks on compositional and sensory qualities of Shrikhand. *Indian J. Nutr. & Dietetics.,* **35**(2):43-46.

Ghodekar D.R., Gandhi, D.N. and Shrinivasan, R.A. (1982). Microbiology of indigenous milk products, Shrikhand. NDRI, Karnal, Annual Report.

Kuila, R.K., Sharma,U.P. and Zariwala, I.T. (1975). Development of starter culture for chakka and Shrikhand in western region. Annual report NDRI, KARNAL, HARYANA (India).

Laxminarayan, H. and Shankar, P.S. (1980). Typical chemical composition of some fermented milk products. *Indian Dairyman,* **32**(2): 121-125.

Nelson, J. A. and Trout, G. M. (1964). Judging of dairy products, (4th edn). The Olsen Publishing Co., Milwaukee, Wis., 439 pp.

Panse, N. G. and Sukhatme,P. V. (1978). *Statistical method for agriculture workers*.Publication and Information, ICAR, New Delhi, pp.157-167.

Patel, R.S. and Abd-El-Salam, M.H. (1986). Shrikhand on Indian analogue of Western gaug. *Cultured Dairy Product J.,* **21**(1):6-79 (*Dairy Sci. Abstr.* **48**:3379).

Sharma, U.P. and Zariwala, I.T.(1980). Deterioration of indigeneous milk products during storage.*Indian J. Dairy Sci.,* **33**(2): 223-231.

Sharma, U.P., Zariwala, I.T. and Kuila, R.K. (1975). Deterioration of indigeneous milk products during storage and factors associated with them. Western Regional Station, Bombay,NDRI, Karnal, Annual Report, 207- 208 PP.

Subramanian, B.S., Nareshkumar, C. and Narsiman, R.(1995). Comparative study of Shrikhand prepared from buffalo, cow and goat skim milk. *Cheiron.,* **24**(1):1-8.

Upadhyay, K.G., Vyas, S.H., Dave, J.M. and Thakur, P.N. (1975). Sudies on chemical composition of market samples of Shrikhand. *Indian J. Dairy Sci.*, **24**(2) :147-151.