

Chemical Evaluation of Low Calorie Shrikhand Prepared by Using Various Artificial Sweeteners

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ABSTRACT

This study was conducted to evaluate the chemical quality of low calorie shrikhand by using artificial sweeteners. There were three different culture *Streptococcus lactis* (A1), *Streptococcus cremoris* (A2) and *Streptococcus diacetelactis* (A3) used at two different incubation temperature as 30°C (B1) and 37°C (B2) for preparation of shrikhand. Four substances like, sucrose (C1) as control, saccharin (C2) and aspartame (C3) were used as sweetener in low calorie shrikhand. The chemical evaluation of various attributes like moisture, fat, protein, lactose, sucrose, ash and acidity percentage were evaluated in chemistry laboratory of Department of Animal Husbandry and Dairying, Chandra Shekhar Azad University of Agriculture and Technology Kanpur, U.P. This process was replicated three times. After the evolution, it is concluded the maximum chemical content of low calorie shrikhand was that contained streptococcus diaacetylactis culture at 37°C incubation temperature with sucrose as sweetening agent followed by aspartame and saccharine.

Key words: Chemical quality, Shrikhand, Artificial sweeteners, Low calorie.

INTRODUCTION

Shrikhand is an indigenous semi-soft, sweetish-sour, whole milk delicious and healthful dessert, particularly in western part of India and prepared from lactic fermented curd. It is made with *chakka* (strained yoghurt/curd) which is finely mixed with sugar and flavouring agents. It has the nutritive goodness of fermented milk products. Like *dahi* (curd), it is very refreshing particularly during summer months. It is popular because of its characteristics flavour, taste, palatable nature and possible therapeutic value⁴. To

reduce the cost and enhance nutritive value of yoghurt some vegetable product has also been incorporated in the milk⁵.

The exact origin of *Shrikhand* is unknown but Western India is credited with the first historical mention of the dish. The dish is very popular in Gujarat and Rajasthan but other states like Maharashtra and Punjab do have local variations that are popular too⁴. Although there is no exact record of how the dish came about, the legend states that travelling herdsmen hung curd or yoghurt overnight to make it easier to carry while travelling.

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The thick yoghurt that was collected the next day was mixed with sugar and nuts to make it palatable during the long journey⁷. At present, it occupies a better place among the confectionaries prepared in the country.

Shrikhand has very high nutritive, characteristics flavour, taste, palatable nature and possible therapeutic value whether it is prepared from curd or yoghurt. *Shrikhand* is very refreshing Indian fermented dairy dessert particularly during summer months which improves the digestive system by strengthening immune system. Keeping all the above mentioned nutritional benefits in the mind we can say that *shrikhand* is the health food.

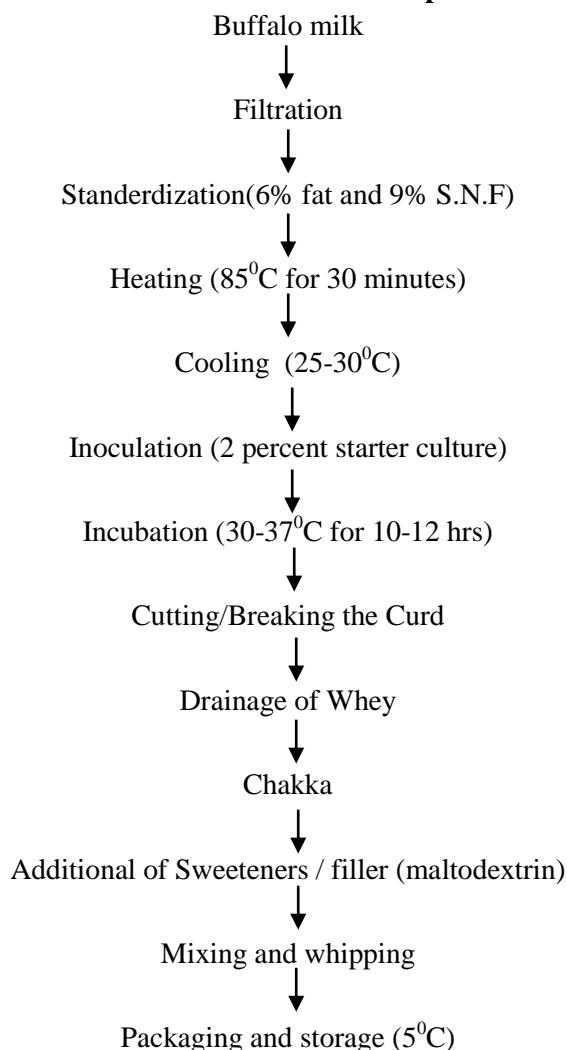
Since the application of intense sweeteners in indigenous dairy products is

new, therefore quantitative information on the sweeteners in the dairy system is required. Considering the need of consumers for low calorie dairy products there is a considerable scope to study the effect of incorporation of fat replacers, intense sweeteners and bulking agents on the quality characteristics of *shrikhand* which is considered as highly calorific dairy product.

MATERIAL AND METHODS

PREPARATION OF SHRIKHAND:- For preparing the *Shrikhand buffalo milk* was received from dairy from of Chandra Shekhar Azad University of Agricultural and Technology Kanpur, then suitable culture was added and the *Shrikhand* was prepared as for the flow chart given below:

Flow Chart for Shrikhand Preparation



There were three different culture *Streptococcus lactic* (A1), *Streptococcus cremoris* (A2) and *Streptococcus diacetilactis* (A3) used at two different incubation temperature as 30⁰C (B1) and 37⁰C (B2) for preparation of shrikhand. Four substances like, sucrose (C1) as control, saccharin (C2) and aspartame (C3) were used as sweetener in low calorie shrikhand. The chemical evaluation of various attributes like moisture, fat, protein, lactose, sucrose, ash and acidity percentage were evaluated in chemistry laboratory of Department of Animal Husbandry and Dairying, Chandra Shekhar Azad University of Agriculture and Technology Kanpur, U.P. Moisture was determined by AOAC¹ method. Fat content in the sample was estimated by the procedure given in AOAC¹. The protein content was determined by Micro-Kjeldahl's process as described in AOAC¹. Lactose, Sucrose Ash and acidity content were determined by the method described in AOAC¹. The data on chemical evaluation obtaining during the study were subjected for analysis of variance (ANOVA) as described by Snedecor and Cochran⁸.

RESULTS AND DISCUSSIONS

Moisture percentage

The minimum moisture percentage of experimental low calorie *Shrikhand* was prepared by using three artificial sweeteners with three different cultures at two different incubation temperatures 39.10 percent while maximum moisture percent was 39.87 for A₃x B₂x C₁ and A₁x B₁x C₂, respectively. The combination that contained *streptococcus diaacetilactis* culture at 37⁰C incubation temperature with sucrose as sweetening agent got minimum moisture percentage and maximum moisture percentage was found to the sample that contained streptococcus lactic incubated at 30⁰C with sachcharine as sweetening agent. All the factors and their interactions were found to be non significant on flavour score (P>0.05) Singh et al⁶.

Fat percentage

The maximum fat percentage of experimental low calorie *Shrikhand* was prepared by using

three artificial sweeteners with three different cultures at two different incubation temperatures 9.91 percent while minimum fat percent was 9.35 for A₃x B₂x C₁ and A₁x B₁x C₂, respectively. The combination that contained *streptococcus diaacetilactis* culture at 37⁰C incubation temperature with sucrose as sweetening agent got maximum fat percentage and minimum fat percentage was found to the sample that contained streptococcus lactic incubated at 30⁰C with sachcharine as sweetening agent. All the factors and their interactions were found to be non significant on flavour score (P>0.05) Bhogra and Mathur².

Protein percentage

The maximum protein percentage of experimental low calorie *Shrikhand* was prepared by using three artificial sweeteners with three different cultures at two different incubation temperatures 5.22 percent while minimum protein percent was 5.14 for A₃x B₂x C₁ and A₁x B₁x C₂, respectively. The combination that contained *streptococcus diaacetilactis* culture at 37⁰C incubation temperature with sucrose as sweetening agent got maximum protein percentage and minimum protein percentage was found to the sample that contained streptococcus lactic incubated at 30⁰C with sachcharine as sweetening agent. All the factors and their interactions were found to be non significant on flavour score (P>0.05) Kumar et al³.

Lactose percentage

The maximum lactose percentage of experimental low calorie *Shrikhand* was prepared by using three artificial sweeteners with three different cultures at two different incubation temperatures 4.42 percent while minimum lactose percent was 4.35 for A₃x B₂x C₁ and A₁x B₁x C₂, respectively. The combination that contained *streptococcus diaacetilactis* culture at 37⁰C incubation temperature with sucrose as sweetening agent got maximum lactose percentage and minimum lactose percentage was found to the sample that contained streptococcus lactic incubated at 30⁰C with sachcharine as sweetening agent. All the factors and their

interactions were found to be non significant on flavour score ($P>0.05$) Singh *et al*⁶.

Sucrose percentage

The result of the investigation in the respect of sucrose attributes on account of various treatments in the control treatment 40% sugar has been found which was based on addition of sugar in reaming combinations sucrose has been found to nil (zero) due to addition of artificial sweeteners in as a components of sweetening agent these sweeteners are calorie free due to trace amount of carbohydrate Kumar *et al*³.

Ash percentage

The maximum ash percentage of experimental low calorie *Shrikhand* was prepared by using three artificial sweeteners with three different cultures at two different incubation temperatures 0.52 percent while minimum ash percent was 0.50 for $A_3 \times B_2 \times C_1$ and $A_1 \times B_1 \times C_2$, respectively. The ash percentage ranges 0.50-0.52 among all the combinations. All the factors and their interactions were found to be non significant on flavour score ($P>0.05$) Bhogra and Mathur².

Titration acidity

The maximum titration acidity percentage of experimental low calorie *Shrikhand* was

prepared by using three artificial sweeteners with three different cultures at two different incubation temperatures 0.83 percent while minimum titration acidity percent was 0.79 for $A_3 \times B_2 \times C_1$ and $A_1 \times B_1 \times C_2$, respectively. The titration acidity ranges 0.79-0.83 percent among all combinations. All the factors and their interactions were found to be non significant on flavour score ($P>0.05$)⁶.

Total solids

The maximum total solids percentage of experimental low calorie *Shrikhand* was prepared by using three artificial sweeteners with three different cultures at two different incubation temperatures 60.90 percent while minimum total solids percent was 60.13 for $A_3 \times B_2 \times C_1$ and $A_1 \times B_1 \times C_2$, respectively. The combination that contained *streptococcus diaacetilactic* culture at 37°C incubation temperature with sucrose as sweetening agent got maximum total solids percentage and minimum total solids percentage was found to the sample that contained streptococcus lactic incubated at 30°C with sacharine as sweetening agent. All the factors and their interactions were found to be non significant on flavour score ($P>0.05$) Singh *et al*⁶.

Table: chemical findings of srikhand -

Combinations	Moisture	Fat	Protein	Lactose	Sucrose	Ash	Titration acidity	Total solids
A1B1C1	39.25	9.88	5.18	4.38	40	0.51	0.8	60.75
A1B1C2	39.87	9.35	5.14	4.35	0	0.5	0.79	60.13
A1B1C3	39.79	9.37	5.16	4.37	0	0.51	0.8	60.21
A1B2C1	39.18	9.9	5.2	4.4	40	0.52	0.8	60.82
A1B2C2	39.28	9.87	5.16	4.37	0	0.52	0.8	60.72
A1B2C3	39.23	9.89	5.18	4.39	0	0.52	0.79	60.77
A2B1C1	39.27	9.87	5.17	4.37	40	0.5	0.82	60.73
A2B1C2	39.37	9.84	5.13	4.34	0	0.5	0.82	60.63
A2B1C3	39.31	9.86	5.15	4.36	0	0.5	0.82	60.69
A2B2C1	39.21	9.89	5.19	4.39	40	0.5	0.82	60.79
A2B2C2	39.31	9.86	5.15	4.36	0	0.5	0.82	60.69
A2B2C3	39.24	9.88	5.17	4.38	0	0.52	0.81	60.76
A3B1C1	39.15	9.89	5.2	4.4	40	0.52	0.84	60.85
A3B1C2	39.26	9.86	5.16	4.37	0	0.52	0.83	60.74
A3B1C3	39.21	9.88	5.18	4.39	0	0.52	0.82	60.79
A3B2C1	39.1	9.91	5.22	4.42	40	0.52	0.83	60.9
A3B2C2	39.2	9.88	5.18	4.39	0	0.52	0.83	60.8
A3B2C3	39.14	9.9	5.2	4.41	0	0.52	0.83	60.86

Analysis of variance:

Factorors	Moisture		Fat		Protein		Lactose		Sucrose	T. Acidity		Ash		Total solids	
	CD	SEd	CD	SEd	CD	SEd	CD	SEd		CD	SEd	CD	SEd	CD	SEd
A	NS	0.53	NS	0.16	NS	0.16	NS	0.16	-	NS	0.01	NS	0.01	NS	0.53
B	NS	0.43	NS	0.13	NS	0.13	NS	0.13	-	NS	0.01	NS	0.01	NS	0.43
AxB	NS	0.75	NS	0.23	NS	0.23	NS	0.23	-	NS	0.02	NS	0.02	NS	0.75
C	NS	0.53	NS	0.16	NS	0.16	NS	0.16	-	NS	0.01	NS	0.01	NS	0.53
AxC	NS	0.92	NS	0.28	NS	0.28	NS	0.28	-	NS	0.02	NS	0.02	NS	0.92
BxC	NS	0.75	NS	0.23	NS	0.23	NS	0.23	-	NS	0.02	NS	0.02	NS	0.75
AxBxC	NS	1.30	NS	0.40	NS	0.40	NS	0.40	-	NS	0.04	NS	0.04	NS	1.30

CONCLUSIONS

The study of this investigation revealed that the maximum chemical content of low calorie shrikhand was containing streptococcus diaacetylactic culture followed by *Streptococcus cremoris* and *Streptococcus lactic*. The favourable incubation temperature was 37⁰C followed by 30⁰C and the sucrose as sweetening agent preferred over aspartame and saccharine. After the evolution, it is concluded the maximum chemical content of low calorie shrikhand was that contained *streptococcus diaacetylactic* culture at 37⁰C incubation temperature with sucrose as sweetening agent followed by aspartame and saccharine.

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