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### Utilization of artificial sweetener (Sucralose) for preparation of flavoured milk

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**Abstract**

Artificial sweetener sucralose was utilized for preparation of flavoured milk with a view to optimize the level of it for preparation of flavoured milk. The experimental treatments *viz.*, No addition of sucralose ( $T_0$ ), addition of 100 ppm sucralose ( $T_1$ ), addition of 150 ppm sucralose ( $T_2$ ) and addition of 200 ppm sucralose ( $T_3$ ) and 6 % sugar (for control) were finalized on the basis of sensory evaluation. The experimental samples were evaluated for sensory, chemical and microbiological qualities. The standard methods were followed for analysis. The flavoured milk samples were chemically analysed for fat, protein, lactose, total solids, acidity and pH. The samples were enumerated for SPC, YMC and coliform counts. The sensory attributes *i.e.* colour and appearance, consistency, flavour and overall acceptability of the product significantly ( $P < 0.05$ ) influenced due to addition of sucralose. It was observed that there was significant ( $p < 0.05$ ) differences in the total solids content, fat, lactose, acidity and pH of the product due to addition of sucralose. The SPC counts of flavoured milk due to addition of sucralose significantly ( $p < 0.05$ ) influenced. There was no of yeast and mould counts observed in flavoured milk samples on day 0 but the range was  $1.14 \times 10^3$ - $2.16 \times 10^4$  cfu/ml from 3<sup>rd</sup> to 5<sup>th</sup> day of storage. The better quality flavoured milk can be prepared by addition of 150 ppm sucralose.

**Keywords:** sucralose, flavour milk, sensory quality, chemical composition, microbial quality

**Introduction**

In today's modern world, the demands for low calorie diet is ever increasing and to keep pace with these needs, it has become essential to use low calorie sweeteners that may replace sucrose and other carbohydrates. These sweeteners are being used for health conscious segment of the consumers to take care of diabetics, dental caries, obesity and weight control. Moreover these low calorie sweeteners also impart good taste qualities to a variety of foods and beverages (www.caloriecontrol.org 2004) [11]. Sweeteners can be divided into two groups: Bulk and intense sweeteners. simple sugars such as, glucose, fructose sucrose, and maltose ; sugar alcohols such as sorbitol, (Maltitol and Lactitol), starch and starch hydrolysates such as glucose syrups and high fructose corn syrups are belongs to the class of bulk sweeteners. They confer body and texture to foods. Most of the bulk sweeteners are completely metabolized by the body and provided an important part of our energy. Intense sweeteners (which are hundreds times sweeter than sucrose) from a very heterogeneous chemical group some are naturally occurring molecules extracted from plant (glycyrrhizin, steviosides, thaumatin); whereas others are artificial compounds obtained by organic synthesis (aspartame, acesulfame-k, sucralose, saccharin, cyclamate, etc.) ; Unlike bulk sweeteners, these are generally not metabolized by the body and are excreted unchanged. For this reason and due to the fact that these are used at very low levels in food, they are referred to as non-nutritive or non-calorie sweeteners (Prodoliet, 1996) [8]. As per notification issued by PFA (2004), the use of artificial sweeteners either singly or in combination has been allowed in food items as per limits prescribed. Present notification permits the use of four artificial sweeteners aspartame, acesulfame, and saccharin, sucralose within prescribed limits of 200, 500, and 750ppm, respectively. Use of artificial sweeteners has been allowed for the first time in sweets like halva, mysore pak boondi ladoo, jalebi khoa, burfi, peda, rasogolla, gulabjamun and similar product based sweets sold by any name. Flavoured milk is one of the special milks which contains all the constituents of milk which provides energy, water to digest food, regulates body temperature and prevent dehydration. From economic point of view flavoured milks are important because it makes more palatable to those who don't relish it as such. Use of artificial sweeteners like sucralose in flavour milk can provide benefit to the diabetic and Obese people.

Keeping in view the nutritional significance of flavoured milk and the importance of sweeteners the present study was planned.

## Materials and Methods

### Materials

#### Milk

Milk samples used for manufacture of flavoured milk were procured from University Dairy farm (RCDP), Mahatma Phule Krishi Vidyapeeth Rahuri, Dist. Ahmednagar (Maharashtra).

#### Ingredients

Ingredients like sugar, flavour .bottles were procured from the local market.

#### Sweetener

Artificial Sweetener (sucralose) was purchased from Lowkal Healthcare Pvt. Ltd. Banglore.

#### B.O.D Incubator

Digital temperature controlled B.O.D incubator manufactured by M/S neutronic, Mumbai (India) was used for microbiological work purpose.

#### Autoclave

An instrument manufactured by M/S. Modern Industries Corporation (MIC) Bombay was used for autoclaving purpose.

#### Colony counter

A Colony Counter with magnifying lens and hand operated and Manufactured by M/S. Modern Industries Pvt. Ltd. Bombay was used for counting the colonies developed by microorganisms.

#### Laminar air flow

An instrument Manufactured by Kirloskar Electrodyne Ltd. Was used for microbiological work.

#### pH meter

Digital pH meter Manufactured by Vishal Scientific Electronics Pvt. Ltd. Ahmednagar was used throughout study to record pH.

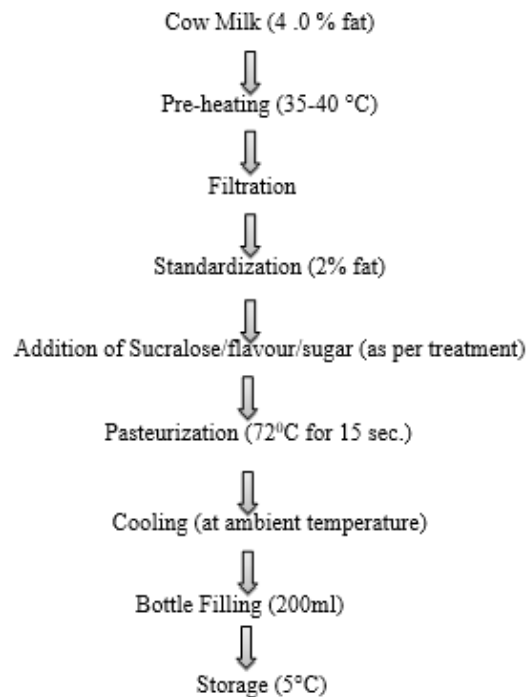
#### Microbiological media

Readymade media manufactured by high media was used for microbiological analysis of samples.

### Methods

#### Preparation of flavoured milk

The flavoured milk was prepared as per procedure given by De (2001) with slight modifications.



The flavoured milk samples were prepared with addition of sucralose @ of 0, 50, 100, 150, 200 and 250 ppm. The 6% sugar was only mixed in the control sample (T<sub>0</sub>). The vanilla flavour was added @0.05% of milk used for preparation of flavoured milk samples. The samples of flavoured milk were subjected to sensory evaluation by five trained judges. On the basis of results of sensory evaluation 0, 100, 150 and 200 ppm sucralose levels were finalized for experimental trials. Six per cent sugar was used to prepare only control (T<sub>0</sub>) sample. Vanilla flavour @ 0.05 % of milk was used for preparation of flavoured milk samples.

#### Chemical analysis of milk

Fat, protein, lactose, total solids, lactic acidity and pH of milk samples was determined as per BIS (1981)

#### Sensory evaluation

The samples of flavoured milk under pre-experimental and experimental treatments were subjected to sensory evaluation by panel of 5 trained judges by using 9 points hedonic scale as per IS: 6272 Part I and Part-II (1971).

#### Microbiological evaluation

The pour plate count method was adopted for enumeration of different groups of microorganism. a) Standard Plate Count: As per BIS 1981) Coliform count: As per IS: 5550 (1970) c) YMC count: As per IS: 5403 (1969)

#### Statistical analysis

Experiment was laid out in Completely Randomized Block

Design (CRD) with four replications for pre-experimental and five for experimental trails. Experimental data was tabulated and analysed by using the method given by Snedecor and Cochran (1967).

## Results and Discussion

### Chemical composition of milk

The chemical composition of milk used for preparation of flavoured milk had fat 2.04%, protein 3.56 %, lactose 4.47 % total solids, titratable acidity 0.14 % L. A. and pH 6.5.

**Table 1:** Chemical Composition of fresh flavoured milk

| Treatment      | Fat % | Protein % | Lactose % | Total solids %     | Acidity % (L.A.) | pH   |
|----------------|-------|-----------|-----------|--------------------|------------------|------|
| T <sub>0</sub> | 2.09  | 3.66      | 4.52      | 10.46 <sup>a</sup> | 0.14             | 6.52 |
| T <sub>1</sub> | 1.98  | 3.62      | 4.52      | 10.40 <sup>a</sup> | 0.16             | 6.40 |
| T <sub>2</sub> | 1.93  | 3.61      | 4.52      | 10.32 <sup>a</sup> | 0.16             | 6.40 |
| T <sub>3</sub> | 1.90  | 3.59      | 4.52      | 10.30 <sup>a</sup> | 0.16             | 6.44 |
| SE             | 0.03  | 0.03      | 0.02      | 0.03               | 0.02             | 0.04 |
| CD at 5%       | 0.11  | 0.10      | 0.05      | 0.9                | 0.7              | 0.12 |
| Result         | sig   | Sig       | NS        | Sig                | Sig.             | Sig  |

### Fat

It is revealed that experimental treatments (Table 1) influenced fat content of the flavoured milk due to addition of sucralose. The mean fat content in the samples of flavoured milk ranged from 1.93 (T<sub>3</sub>) to 2.09 (T<sub>0</sub>) per cent. Salunkhe (2002) reported the fat content in the range of 2.86-2.88 per cent while formulating flavoured milk. Kumar *et al.* (1989)<sup>[8]</sup> while formulating different milk beverages reported 1.5-6 per cent fat. Shelke *et al.* (2008)<sup>[9]</sup> studied the effect different levels of physico-chemical properties and acceptability of flavoured milk. They observed the mean fat content varied 2.86-2.88% in different blends.

### Protein

The influence of addition of sucralose on protein content of flavoured milk (Table 1) was significant. The mean protein

content under different samples of flavoured milk varied from 3.59 to 3.66 per cent. Dalim *et al.* (2012)<sup>[2]</sup> studied production and comparison of banana and chikoo milk beverage and reported protein content  $4.14 \pm 0.13$  in banana flavoured milk based beverage and chikoo flavour based  $3.56 \pm 0.93$  per cent protein.

### Lactose

It is indicated that the experimental treatments (Table 1) did not affected the lactose content of flavoured milk. The mean lactose content in the samples under experimental treatments was 4.52 per cent.

### Total solids

The influence of experimental treatments significantly ( $P < 0.05$ ) affected the total solids content of flavoured milk due to addition of sucralose in the flavoured milk. The mean total solids content ranged from 10.30 (T<sub>0</sub>) to 10.46 (T<sub>3</sub>) per cent. The total solids content increased as the level of sucralose increased. The treatment (T<sub>3</sub>) significantly ( $p < 0.05$ ) differed among all other treatments studied. Treatment T<sub>0</sub> and T<sub>1</sub> were on a par. Rajesh kumar *et al.* (1989) formulated flavoured milk like beverage from cheese whey and reported 13 to 15 per cent total solids.

### Acidity (% LA)

The influence of addition of sucralose on the titratable acidity found to be significant ( $P < 0.05$ ). The titratable acidity was ranged from 0.14-0.16 per cent LA. It indicates that the sucralose affected the acidity content of flavoured milk. Shelake *et al.* (2008) studied the effect of different flavours on the physico-chemical properties and acceptability of flavoured milk and noted the acidity content of flavoured milk as 0.13 % LA.

### pH

The mean values for the pH of the flavoured milk ranged from 6.40 to 6.52.

**Table 2:** Sensory quality of fresh flavoured milk (sensory score out of 9)

| Treatment      | Colour and Appearance | Consistency       | Flavour           | Overall acceptability |
|----------------|-----------------------|-------------------|-------------------|-----------------------|
| T <sub>0</sub> | 8.33 <sup>b</sup>     | 7.86 <sup>b</sup> | 8.20 <sup>a</sup> | 8.22 <sup>a</sup>     |
| T <sub>1</sub> | 8.65 <sup>a</sup>     | 8.22 <sup>a</sup> | 7.84 <sup>b</sup> | 8.22 <sup>a</sup>     |
| T <sub>2</sub> | 8.73 <sup>a</sup>     | 8.41 <sup>a</sup> | 8.24 <sup>a</sup> | 8.32 <sup>a</sup>     |
| T <sub>3</sub> | 8.81 <sup>a</sup>     | 7.72 <sup>a</sup> | 7.36 <sup>c</sup> | 8.0 <sup>b</sup>      |
| SE             | 0.07                  | 0.13              | 0.06              | 0.07                  |
| CD at 5%       | 0.21                  | 0.38              | 0.18              | 0.21                  |

### Colour and appearance

Immediately after preparation of flavoured milk samples was subjected to the sensory evaluation for testing their sensory attributes. The colour and appearance of any product is one of the important attribute of sensory evaluation. It is revealed that the main sensory score for colour appearance of the product under different treatment was significant ( $P < 0.05$ ) due to addition of sucralose. It means that the addition of sucralose in the flavoured milk influenced the colour and appearance of the product. The mean score for colour and appearance of the flavoured milk ranged from 8.33 (T<sub>0</sub>) to 8.81 (T<sub>3</sub>).

### Consistency

The consistency of the flavoured milk due to addition of sucralose significantly ( $P < 0.05$ ) influenced. The mean score for consistency range from 7.72 (T<sub>3</sub>) to 8.41 (T<sub>2</sub>). The

treatment T<sub>0</sub> had thinner consistency as compare to other treatment samples.

### Flavour

The flavour is the most important component of sensory attribute. The mean score for flavour was 8.20, 7.84, 8.24 and 7.36 for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> treatments, respectively. The treatment T<sub>2</sub> with 8.24 flavour score was the highest than other treatments. It might be due to the flavour of sucralose.

### Overall acceptability

From Table2, it is seen that the addition of different levels of sucralose in the flavoured milk significantly ( $P < 0.05$ ) influenced the overall acceptability. The mean overall acceptability score ranged from 7.86 (T<sub>3</sub>) 8.32 (T<sub>2</sub>). The highest overall acceptability score 8.32 was observed in (T<sub>2</sub>) over the rest of sample treatments. The overall acceptability

influenced due to sucralose levels in the flavoured milk again treatment (T<sub>0</sub>) showed highest overall acceptability. Mule *et al.* (2014) [7] prepared fig milk shake from buffalo milk and noted overall acceptability score 8.25 on day 0.

#### Microbiological quality of the fresh flavoured milk.

There was no YMC and coliform counts observed in freshly prepared flavoured milk samples. The SPC count ranged from 0.46 x 10<sup>2</sup> to 0.52 x 10<sup>2</sup> cfu/ml of flavoured milk (Table 3).

**Table 3:** Microbiological quality of fresh flavoured milk

| Treatment      | SPC (10 <sup>2</sup> cfu/ml) |
|----------------|------------------------------|
| T <sub>0</sub> | 0.48                         |
| T <sub>1</sub> | 0.46                         |
| T <sub>2</sub> | 0.52                         |
| T <sub>3</sub> | 0.46                         |
| SE             | 0.05                         |
| CD at 5%       | 0.16                         |

#### Influence of addition of sucralose on sensory quality of Flavoured milk during storage

##### Colour Appearance

The influence of addition of different levels of sucralose on colour and appearance of flavoured milk (Table 4) was significant (P < 0.05) on all the days of storage i.e. 0, 3 and 5<sup>th</sup> day of storage. Treatment T<sub>0</sub> was significantly differed on day 0 whereas T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> on par on day 0 of storage. Treatment T<sub>3</sub> was significantly differed on a day 3<sup>rd</sup> of storage period. T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> were on par on day 3<sup>rd</sup> of storage. The treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub> were on par on 5<sup>th</sup> day of storage.

**Table 4:** Influence of addition of sucralose on Colour and Appearance of flavoured milk.

| Treatment      | 0 Day             | 3 Days            | 5 Days            |
|----------------|-------------------|-------------------|-------------------|
| T <sub>0</sub> | 8.33 <sup>b</sup> | 6.28 <sup>a</sup> | 4.61 <sup>a</sup> |
| T <sub>1</sub> | 8.65 <sup>a</sup> | 6.42 <sup>a</sup> | 4.76 <sup>a</sup> |
| T <sub>2</sub> | 8.73 <sup>a</sup> | 6.58 <sup>a</sup> | 4.39 <sup>b</sup> |
| T <sub>3</sub> | 8.81 <sup>a</sup> | 5.91 <sup>b</sup> | 4.25 <sup>b</sup> |
| SE             | 0.07              | 0.13              | 0.12              |
| CD at 5%       | 0.21              | 0.39              | 0.36              |

##### Consistency

From Table 5, it is seen that the addition of different levels of sucralose in the flavoured milk the consistency of the product was significantly influenced on day 0, 3, 5 of the storage period the mean score for consistency was 7.72-8.41 on a day 0 of storage. Treatment T<sub>0</sub> and T<sub>3</sub> were significantly differ on day 0 of storage. T<sub>1</sub>, T<sub>2</sub> on par on day 0 of storage.

**Table 5:** Influence of addition of sucralose on Consistency of flavoured milk

| Treatment      | 0 day             | 3 days            | 5 days            |
|----------------|-------------------|-------------------|-------------------|
| T <sub>0</sub> | 7.86 <sup>b</sup> | 6.38 <sup>a</sup> | 4.45 <sup>a</sup> |
| T <sub>1</sub> | 8.22 <sup>a</sup> | 6.26 <sup>a</sup> | 4.26 <sup>b</sup> |
| T <sub>2</sub> | 8.41 <sup>a</sup> | 5.82 <sup>b</sup> | 3.54 <sup>c</sup> |
| T <sub>3</sub> | 7.72 <sup>a</sup> | 5.54 <sup>c</sup> | 3.41 <sup>c</sup> |
| SE             | 0.13              | 0.17              | 0.10              |
| CD at 5%       | 0.38              | 0.50              | 0.29              |

The treatments T<sub>2</sub>, T<sub>3</sub> were significantly differed on 3<sup>rd</sup> day of storage. T<sub>1</sub>, T<sub>0</sub> on par on day 3<sup>rd</sup> of storage. T<sub>0</sub>, T<sub>1</sub> were significantly differed. The treatments T<sub>2</sub> and T<sub>3</sub> .on par on 5<sup>th</sup> day of storage. Treatment T<sub>2</sub> and T<sub>3</sub> were on par whereas T<sub>0</sub> and T<sub>1</sub> were on par on day 5<sup>th</sup> of storage period.

#### Flavour

The influence of addition of different levels of sucralose on flavour (Table 6) of the flavoured milk was significant (p < 0.05) on a day 0, 3, 5 of storage period. The mean flavour score was ranged from 7.36 to 8.24 on days 0. The sensory score for flavour ranged from 7.22 to 7.62 and 6.74 to 7.32 on a 3<sup>rd</sup> and 5<sup>th</sup> day of storage period.

**Table 6:** Influence of addition of sucralose on flavour of flavoured milk

| Treatment      | 0 Day             | 3 Days             | 5 Days            |
|----------------|-------------------|--------------------|-------------------|
| T <sub>0</sub> | 8.20 <sup>a</sup> | 7.62 <sup>a</sup>  | 7.32 <sup>a</sup> |
| T <sub>1</sub> | 7.84 <sup>b</sup> | 7.50 <sup>a</sup>  | 6.84 <sup>b</sup> |
| T <sub>2</sub> | 8.24 <sup>a</sup> | 7.72 <sup>ab</sup> | 6.82 <sup>b</sup> |
| T <sub>3</sub> | 7.36 <sup>c</sup> | 7.22 <sup>c</sup>  | 6.74 <sup>c</sup> |
| SE             | 0.06              | 0.07               | 0.03              |
| CD at 5%       | 0.18              | 0.22               | 0.08              |

Mule *et al.* (2014) [7] reported that buffalo fig milk shake had score for flavour 8.23. Muhmad *et al.* (1996) reported that samples of cow milk flavoured with mango flavour was mostly acceptable

#### Overall acceptability

The influence of addition of different levels of sucralose on overall acceptability (Table 7) was significant on all the day of storage period i.e. on 0, 3<sup>rd</sup>, 5<sup>th</sup> day of storage. Treatment T<sub>3</sub> significantly differed among rest of treatments on day 0 and 5<sup>th</sup> of storage period. Treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> were on par on day 0. Treatment T<sub>0</sub>, T<sub>3</sub> were significantly on day 3<sup>rd</sup> of storage treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> were on par on day 5<sup>th</sup> of storage.

**Table 7:** Influence of addition of sucralose on overall acceptability of flavoured milk.

| Treatment      | 0 Day             | 3 Days            | 5 Days             |
|----------------|-------------------|-------------------|--------------------|
| T <sub>0</sub> | 8.22 <sup>a</sup> | 7.82 <sup>a</sup> | 6.86 <sup>a</sup>  |
| T <sub>1</sub> | 8.22 <sup>a</sup> | 7.52 <sup>a</sup> | 6.78 <sup>ab</sup> |
| T <sub>2</sub> | 8.32 <sup>a</sup> | 7.86 <sup>b</sup> | 6.80 <sup>a</sup>  |
| T <sub>3</sub> | 8.0 <sup>b</sup>  | 7.00 <sup>c</sup> | 6.74 <sup>c</sup>  |
| SE             | 0.07              | 0.06              | 0.03               |
| CD at 5%       | 0.21              | 0.19              | 0.08               |

#### Influence of addition of sucralose on chemical composition flavoured milk during storage period

##### Fat

The influence of addition of different levels of sucralose on fat content of flavoured milk was non-significant on day 0 and significant (P < 0.05) on day 3 and day 5 during storage. The mean fat content ranged from 1.99 to 2.09 on day 0 1.63 to 1.74 on a day 3 and day 5 during storage period (Table 8) Treatment T<sub>0</sub>, T<sub>1</sub> and T<sub>3</sub> were on par on day 3 and treatment T<sub>0</sub>, T<sub>2</sub>, T<sub>3</sub> were on par on day 5 of storage. Treatment T<sub>2</sub> differed significantly on a day 3 and treatment T<sub>1</sub> differed significantly (P < 0.05) on day 5 of storage period.

**Table 8:** Influence of addition of sucralose on fat content of flavoured milk

| Treatment      | 0 Day | 3 Days            | 5 Days            |
|----------------|-------|-------------------|-------------------|
| T <sub>0</sub> | 2.09  | 1.74 <sup>a</sup> | 1.68 <sup>a</sup> |
| T <sub>1</sub> | 1.98  | 1.74 <sup>a</sup> | 1.63 <sup>b</sup> |
| T <sub>2</sub> | 1.93  | 1.66 <sup>b</sup> | 1.68 <sup>a</sup> |
| T <sub>3</sub> | 1.99  | 1.72 <sup>a</sup> | 1.65 <sup>a</sup> |
| SE             | 0.03  | 0.01              | 0.01              |
| CD at 5%       | 0.11  | 0.04              | 0.04              |

**Table 9:** Influence of addition of sucralose on protein content of flavoured milk

| Treatment      | 0 Day | 3 Days | 5 Days |
|----------------|-------|--------|--------|
| T <sub>0</sub> | 3.66  | 3.49   | 3.30   |
| T <sub>1</sub> | 3.62  | 3.49   | 3.28   |
| T <sub>2</sub> | 3.61  | 3.49   | 3.18   |
| T <sub>3</sub> | 3.59  | 3.48   | 3.12   |
| SE             | 0.03  | 0.01   | 0.05   |
| CD at 5%       | 0.10  | 0.03   | 0.16   |

### Protein content

The mean protein content ranged from 3.12 (T<sub>3</sub>) to 3.66(T<sub>0</sub>) during storage period. The addition of different levels of sucralose in the flavoured milk significantly (P<0.05) influenced the protein content in the flavoured milk on the day 3 and 5<sup>th</sup> day of storage period.

### Lactose

The addition of different levels of sucralose in the flavoured milk significantly (P<0.05) influenced the lactose content in the flavoured milk on the day 3 and 5<sup>th</sup> day of storage period. But the difference was non-significant on day 0. The mean lactose content was 4.52 per cent on day 0.

**Table 10:** Influence of addition of sucralose on Lactose content of flavoured milk

| Treatment      | 0 Day | 3 Days            | 5 Days            |
|----------------|-------|-------------------|-------------------|
| T <sub>0</sub> | 4.52  | 4.52 <sup>a</sup> | 4.30 <sup>a</sup> |
| T <sub>1</sub> | 4.52  | 4.49 <sup>a</sup> | 4.18 <sup>a</sup> |
| T <sub>2</sub> | 4.52  | 4.47 <sup>b</sup> | 4.15 <sup>a</sup> |
| T <sub>3</sub> | 4.52  | 4.45 <sup>c</sup> | 3.90 <sup>b</sup> |
| SE             | 0.02  | 0.01              | 0.07              |
| CD at 5%       | 0.05  | 0.3               | 0.20              |

The mean values of lactose content ranged from 3.90 T<sub>3</sub> to 4.52 (T<sub>1</sub>) on a 3<sup>rd</sup> and 5<sup>th</sup> day of storage period. Treatment T<sub>2</sub> and T<sub>3</sub> were significantly (P<0.05) differed on 3<sup>rd</sup> day of storage period. Whereas T<sub>1</sub>, T<sub>0</sub> on par on 3<sup>rd</sup> day of storage again T<sub>3</sub> were significantly differ among other treatments on the 5<sup>th</sup> day of storage rest of the treatments i.e.T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> on par on 5<sup>th</sup> day of storage period.

### Total solids

There was significant difference on total solids content of flavoured milk due to addition different levels of sucralose in flavoured milk on day 0. Treatments T<sub>0</sub>, T<sub>1</sub> were significantly differed among rest of the treatments in the study. The T<sub>2</sub>, T<sub>3</sub> were on par on day 0 of storage. The influence of different levels addition of sucralose was non-significant on 3 and 5 day. The mean total solids contents ranged 9.50 (T<sub>3</sub>) to 9.70 (T<sub>0</sub>) during storage period of day 3 and day 5.

**Table 11:** Influence of addition of sucralose on Total solids content of flavoured milk

| Treatment      | 0 Day              | 3 Days | 5 Days |
|----------------|--------------------|--------|--------|
| T <sub>0</sub> | 10.46 <sup>a</sup> | 9.70   | 9.54   |
| T <sub>1</sub> | 10.40 <sup>a</sup> | 9.70   | 9.56   |
| T <sub>2</sub> | 10.32 <sup>a</sup> | 9.72   | 9.54   |
| T <sub>3</sub> | 10.30 <sup>a</sup> | 9.72   | 9.50   |
| SE             | 0.03               | 0.11   | 0.05   |
| CD at 5%       | 0.09               | 0.16   | 0.16   |

### Lactic acidity (% L A)

Influence of addition of different levels of sucralose on acidity content of flavoured milk was non-significant on day 0

and day 3 (Table 12). Whereas there was significant (P < 0.05) difference on day 5 of storage period. The mean acidity content ranged from 0.14-0.16 % L.A. on day 0. Whereas it ranged from 0.16 to 0.20 % L.A. on a day 3 and 5<sup>th</sup> day of storage period.

**Table 12:** Influence of addition of sucralose on Acidity (%LA) Content of flavoured milk.

| Treatment      | 0 Day | 3 <sup>rd</sup> Days | 5 <sup>th</sup> Days |
|----------------|-------|----------------------|----------------------|
| T <sub>0</sub> | 0.14  | 0.16                 | 0.19 <sup>ab</sup>   |
| T <sub>1</sub> | 0.16  | 0.17                 | 0.19 <sup>ab</sup>   |
| T <sub>2</sub> | 0.16  | 0.17                 | 0.20 <sup>a</sup>    |
| T <sub>3</sub> | 0.16  | 0.17                 | 0.20 <sup>a</sup>    |
| SE             | 0.02  | 0.01                 | 0.03                 |
| CD at 5%       | 0.07  | 0.01                 | 0.1                  |

### pH

The influence of addition of different levels of sucralose on pH of flavoured milk was non-significant on day 0 and significant (p < 0.05) on day 3<sup>rd</sup> and 5<sup>th</sup> of storage period the mean pH value ranged 6.40 to 6.52 on day 0 of storage (Table 13).

**Table 13:** Influence of addition of sucralose on pH content of flavoured milk

| Treatment      | 0 Day | 3 Days            | 5 Days            |
|----------------|-------|-------------------|-------------------|
| T <sub>0</sub> | 6.52  | 6.34 <sup>a</sup> | 6.06 <sup>a</sup> |
| T <sub>1</sub> | 6.40  | 6.26 <sup>b</sup> | 5.90 <sup>b</sup> |
| T <sub>2</sub> | 6.40  | 6.16 <sup>c</sup> | 5.80 <sup>c</sup> |
| T <sub>3</sub> | 6.44  | 6.14 <sup>c</sup> | 5.80 <sup>c</sup> |
| SE             | 0.05  | 0.03              | 0.0               |
| CD at 5%       | 0.10  | 0.07              | 0.09              |

Whereas it was ranged from 6.34 to 5.80 on a day 3<sup>rd</sup> and 5<sup>th</sup> of storage period. Treatment T<sub>2</sub> and T<sub>3</sub> were on par on 3<sup>rd</sup> and 5<sup>th</sup> day of storage period, Whereas T<sub>0</sub>, T<sub>1</sub> were significantly (p < 0.05) differ on both day of storage period.

### Influence of addition of sucralose on microbiological quality of flavoured milk during storage

#### SPC

The influence of addition of different levels of sucralose on SPC of flavoured milk was non-significant on day 0 and significant on day 3<sup>rd</sup> and 5<sup>th</sup> of storage period. The SPC ranged from 0.46-0.52 on a day 0.

**Table 14:** Influence of addition of sucralose on SPC of flavoured milk

| Treatment      | 0 Day(x10 <sup>2</sup> cfu/ml) | 3 Days(x10 <sup>3</sup> cfu/ml) | 5 Days(x10 <sup>4</sup> cfu/ml) |
|----------------|--------------------------------|---------------------------------|---------------------------------|
| T <sub>0</sub> | 0.48                           | 2.09 <sup>a</sup>               | 2.14 <sup>a</sup>               |
| T <sub>1</sub> | 0.46                           | 1.98 <sup>a</sup>               | 2.26 <sup>a</sup>               |
| T <sub>2</sub> | 0.52                           | 1.93 <sup>b</sup>               | 1.99 <sup>b</sup>               |
| T <sub>3</sub> | 0.46                           | 1.99 <sup>a</sup>               | 1.99 <sup>b</sup>               |
| SE             | 0.05                           | 0.04                            | 0.07                            |
| CD at 5%       | 0.16                           | 0.11                            | 0.21                            |

The mean SPC ranged from 1.93 x 10<sup>3</sup>-2.09 x 10<sup>3</sup>cfu/ml on day 3 and 1.99-2.14 x 10<sup>4</sup>cfu/ml on day 5<sup>th</sup> of storage period. Treatment T<sub>2</sub> was significantly differed on day 3. Whereas T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub> were on par on day 3 of storage. The treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub> were on par on 5<sup>th</sup> day of storage period.

#### YMC

The influence of addition of different levels of sucralose on

YMC of flavoured milk was significant ( $p < 0.05$ ) on 3<sup>rd</sup> and 5<sup>th</sup> day of storage period. There was no counts of YMC on day 0 of storage period in flavoured milk samples. The mean counts ranged from  $1.26 \times 10^3$  cfu/ml to  $2.16 \times 10^4$  cfu/ml on 3<sup>rd</sup> and 5<sup>th</sup> day of storage period

**Table 15:** Influence of addition of sucralose on YMC of flavoured milk

| Treatment      | 0 Days | 3 Days( $\times 10^3$ cfu) | 5 Days( $\times 10^4$ cfu) |
|----------------|--------|----------------------------|----------------------------|
| T <sub>0</sub> | 0      | 1.26 <sup>a</sup>          | 2.16 <sup>a</sup>          |
| T <sub>1</sub> | 0      | 1.38 <sup>a</sup>          | 1.98 <sup>b</sup>          |
| T <sub>2</sub> | 0      | 1.12 <sup>b</sup>          | 1.93 <sup>b</sup>          |
| T <sub>3</sub> | 0      | 1.14 <sup>c</sup>          | 1.99 <sup>b</sup>          |
| SE             | 0      | 0.07                       | 0.04                       |
| CD at 5%       | 0      | 0.20                       | 0.11                       |

### Coliform counts

No coliform count was observed in the flavoured milk samples during storage.

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