Research Article

Storage Study of *Danadar* Prepared from Cow Milk

B.K. Singh[1], D.C. Sen[2], Rakesh Kumar[1], Binita Rani[1] and A.K. Barman[2]

[1] Faculty of Dairy Technology, S.G.I.D.T., BASU, Patna-800014
[2] Faculty of Dairy Technology, WBUAFS, Mohanpur campus, Nadia-741252 (W.B.)

Abstract

Danadar is a chhana bassed sweets. In this research *danadar* was prepared from cow milk. The storage study of optimized *danadar* samples were conducted. During storage, sensory, chemical and microbial analysis were performed. *Danadar* samples were subjected to sensory evaluation studies at 5 days interval commencing from 1st day of storage period, with a view to asses the shelf life of the product under ambient temperature (30±1˚C) and refrigeration temperature (7±1˚C). Scores for all the sensory attributes of the prepared cow milk *danadar* decreased significantly (P<0.05) throughout the storage period. The moisture content of the sample also decreased significantly (P<0.05) with progress of storage period. The titratable acidity (percent lactic acid), free fatty acids (percent oleic acid), and peroxide values of *danadar* were significantly (P<0.05) higher at the end of storage period from the initial value obtained on 0 day. After 15th and 35th days of storage at ambient temperature (30±1˚C) and refrigeration temperature (7±1˚C), respectively, *danadar* samples developed oxidized flavor rendering the product unsuitable for consumption. The total viable, yeast mold, coliform and staphylococcal counts of the samples also increased significantly (P<0.05) as the period of storage advanced. It may be concluded that after 15th and 35th days of storage at ambient and refrigerated temperatures, respectively, all the above mentioned microbial counts in *danadar* increased to a undesirable level.

Keywords: *Danadar*, Storage, Ambient, Refrigerated Temperature

***Correspondence**
Author: B.K. Singh
Email: bipinsgidt@gmail.com

Introduction

Various traditional milk products like *rasogolla, gulabjamum, sandesh, burfi, peda, balusahi, danadar, misti dahi,* etc. are made in our country since ancient times because of their social, economic, religious, medicinal and cultural affairs. The sweetmeats that are available in the market are mostly *chhana*-based palatable milk products. In each sphere of life, sweetmeats have occupied a significant place in our society. Sweetmeats have a significant role in our culture. There is no such ceremony or festival which goes without sweetmeats. Among these, *danadar* occupies a unique place in West Bengal.

Danadar is a popular *chhana* based sweet of West Bengal. It is characterized by an unorganized nature of business. Indigenous milk products have a big potential of the emerging dairy industry in the organized sector. *Danadar* is usually sold in spherical form. It is golden in color and has a semi hard to firm body with granular texture. It is boiled in the sugar syrup till golden color develops. *Danadar* is rolled on sugar granules. It is a classic way for preservation of milk solids. *Danadar* was originated by Dwarik`s sweet shop of Shyama Pukur Street in Kolkata. The shop used to sell *danadar*. Dwarik`s sweet shop was set up in 1885. In 1925, it was named as Dwarik Ghosh & Sons Ltd. Finally in 1955, the name became Dwarik Grand Sons.

The problem encountered in the manufacturing and storage of *danadar* is too many. In view of the influence of processing parameter towards micro structure, texture and flavor of *danadar*, it is essential that the sensory quality of the product which is one of the most important selling points for any product will be affected adversely by the improper method of processing and storage. In view of its popularity, economic benefits and assured market demands, there is an urgent need to produce *danadar of* good quality for meeting the FSSAI /Export standards. Restricted shelf-life for most of the desserts is also a major limitation in marketing of these products.

The present investigation is taken up to optimize the process to formulate *danadar* from cow milk. The process for preparation of *danadar* from cow milk was optimized and the final product was stored at ambient temperature (30±1˚C) and refrigeration temperature (7±1˚C), respectively, to analysed the shelf life at both temperatures.

Material and Methods

Sample collection

The optimized *danadar* samples were drawn in presterilized plastic pot of the laboratory, Faculty of Dairy Technology, Mohanpur, Nadia. All conical flasks, volumetric flasks, measuring cylinders, pipettes and burettes etc. used were made of *Borosil*.

Sensory evaluation of danadar

Danadar prepared was subjected to sensory evaluation by a panel of five judges using a 9 point Hedonic scale (Amerine *et al.,* 1965) as shown in **Table 1** [1].

Judges evaluated the products with respect to color and appearance, flavor, body and texture and overall acceptability. The scores awarded by the judges were compiled for analysis. All the replicates were carried out 3 times to detect the mean and standard values.

Table 1 Sensory score card (9-point hedonic scale)

Numerical score	Score subjective
9	Liked extremely
8	Liked very much
7	Liked moderately
6	Liked slightly
5	Neither liked nor disliked
4	Disliked slightly
3	Disliked moderately
2	Disliked very much
1	Disliked extremely

Chemical analysis

Representative sample of *danadar* was tested for moisture, fat, protein, carbohydrates and ash. The procedure as described in FSSAI: Part III-sec-1: 356-386(2011) was followed for sampling and analysis [2]. About 50 g of *danadar* was finely ground and kept in capped plastic sample cups at refrigeration temperature (7 ± 1°C) till analysis was completed. The moisture content was determined by the gravimetric method as described in manual of FSSAI (2011).The total fat content was determined by Rose-Gottleib method as described in (ISI 1981), SP: 18 (Part XI). The protein content of *danadar* was estimated by the micro-Kjeldahl method outlines by Jayram (1981)[3]. *Danadar* sample was analyzed for total solid and ash following the method described in IS: 2785 (1979)[4]. The total carbohydrates content was calculated by method of difference. For this purpose total fat, protein, and ash content of the *danadar* was subtracted from total solids.

Microbiological Examination of **Danadar**

The total viable, yeast and mold, coliform and staphylococcus counts in the samples were determined as per the methods suggested in APHA (1984)[5].

Statistical analysis

The Data obtained were statistically analyzed.

Results and Discussion

The shelf life of *danadar* samples was studied to assess the conditions for storage at ambient temperature (30±1˚C) and refrigeration temperature (7±1˚C). The following sensory, chemical and microbial changes were observed.

Sensory changes

Sensory evaluation plays a vital role not only in product development but also in determining the shelf life of a product. All deteriorative changes *i.e*., oxidative, lipolytic, proteolysis, browning, acidity development; microbial and textural changes are collectively correlated with sensory quality and thus lead eventually to rejection of the stored product. From the consumers point of view, it is one of the primary characteristics based on which the quality of product is decided.

Danadar samples were subjected to sensory evaluation studies at 5 days interval commencing from 1st day of storage period, with a view to asses the shelf life of the product under ambient temperature (30±1˚C) and refrigeration temperature (7±1˚C). The color and appearance, flavor, body and texture and overall acceptability scores on Nine Point Hedonic scale were evaluated by judges independently. Whatever the changes in sensory scores of *danadar* at ambient and refrigerated temperatures were obtained, are presented in **Table 2**.

Table 2 Effect of storage at ambient and refrigerated temperatures on sensory attributes of cow milk *danadar*

Storage Day	Color & appearance		Flavor		Body & texture		Overall acceptability	
	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature
0	8.27 ± 0.13^{a}	8.27 ± 0.13^{a}	8.47 ± 0.03^{a}	8.47 ± 0.03^{a}	8.93 ± 0.03^{a}	8.93 ± 0.03^{a}	8.47 ± 0.03^{a}	8.47 ± 0.03^{a}
5	7.43 ± 0.03^{Bb}	8.33 ± 0.03^{Aa}	7.67 ± 0.12^{Bb}	8.10 ± 0.06^{Ab}	7.30 ± 0.06^{Bb}	8.33 ± 0.03^{Ab}	7.43 ± 0.03^{Bb}	8.35 ± 0.03^{Aa}
10	6.60 ± 0.21^{Bc}	7.65 ± 0.03^{Ab}	6.10 ± 0.06^{Bc}	7.80 ± 0.06^{Ac}	6.17 ± 0.09^{Bc}	7.87 ± 0.09^{Ac}	6.33 ± 0.07^{Bc}	7.73 ± 0.06^{Ab}
15	5.53 ± 0.03^{Bd}	7.45 ± 0.03^{Ac}	5.40 ± 0.06^{Bd}	7.45 ± 0.03^{Ad}	5.23 ± 0.12^{Bd}	7.52 ± 0.04^{Ad}	5.10 ± 0.10^{Bd}	7.42 ± 0.04^{Ac}
20		6.67 ± 0.09^{d}		6.95 ± 0.03^{e}		6.73 ± 0.06^{e}		6.45 ± 0.03^{d}
25		5.65 ± 0.03^{e}		6.10 ± 0.06^{f}		5.82 ± 0.04^{f}		6.20 ± 0.12^{e}
30		5.10 ± 0.06^{f}		5.27 ± 0.12^{g}		5.35 ± 0.03^{g}		5.30 ± 0.12^{f}
35		4.62 ± 0.04^{g}		4.80 ± 0.03^{h}		4.83 ± 0.04^{h}		4.38 ± 0.06^{g}

a,b,…,h: means ± SE with different superscript within a column differ significantly (P<0.05)
A,B: means ± SE with different superscript within a row differ significantly (P<0.05)

Color and appearance

The Table 2 and **Figure 1** indicates the color and appearance scores of *danadar* samples stored at ambient and refrigerated temperatures. The color and appearance score of *danadar* was initially higher. As the storage period increased, cow milk *danadar* stored at 30˚C showed a rapid increase in browning index, resulting in lower final score. The initial color and appearance score of *danadar* was 8.27±0.13 at both ambient and refrigerated temperature, which decreased to 5.53±0.03 and 4.62±0.04 in 15th and 35th days of storage, respectively. The color turned to dull and yellow along with the slime formation and mold growth on the surface.

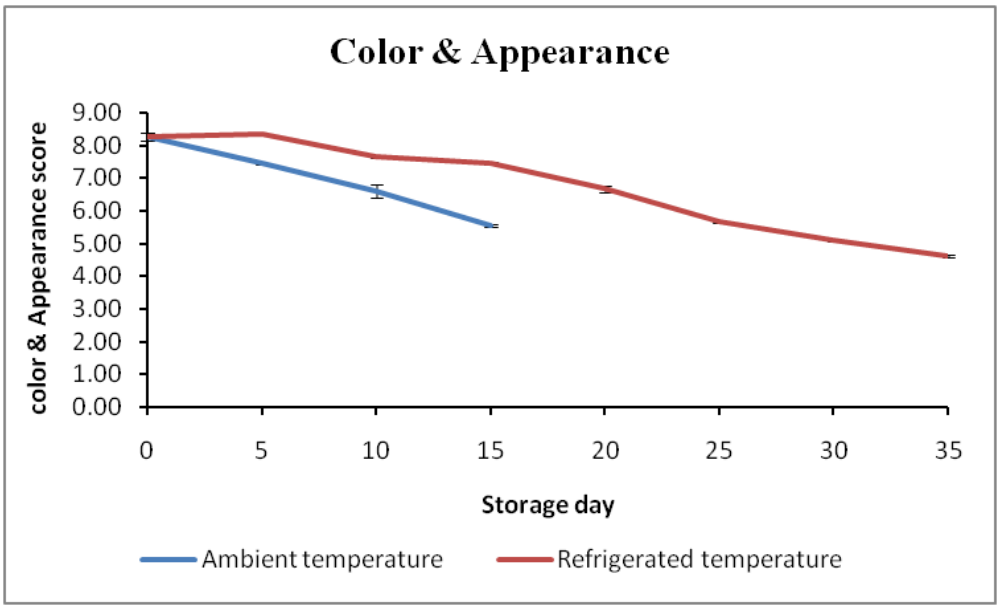

Figure 1 Effect of storage on color & appearance at ambient and refrigerated temperature

The final score declined to a minimum extent after 15th and 35th days, respectively at ambient and refrigerated conditions, after which they were declared unacceptable by the panel of judges. Color and appearance score for cow milk *danadar* decreased significantly (P<0.05) throughout the storage period as shown in Table 2.

Flavor

The changes in flavor score of *danadar* samples prepared from cow milk during storage are presented in Table 2 and expressed in **Figure 2**. It is evident from table that; *danadar* stored at refrigerated temperature had a better flavor score than at ambient temperature. The flavor score of the *danadar* prepared from cow milk decreases with increase in storage periods. The deterioration was faster at 30˚C than at 7˚C, indicating a significant increase in the free fatty acids resulting concomitant increase in peroxide value so as flavor score during storage. The pleasant flavor of *danadar*, stored at ambient temperature turned acidic and foul smell at the end of 15th days while for refrigerated condition 35th days, respectively. The study further revealed that the decline in flavor score was due to the production of rancid flavor and bitter taste along with some other off flavor reached to an extreme level in 35th days of storage after which the refrigerated *danadar* samples were declared unacceptable by the judges.

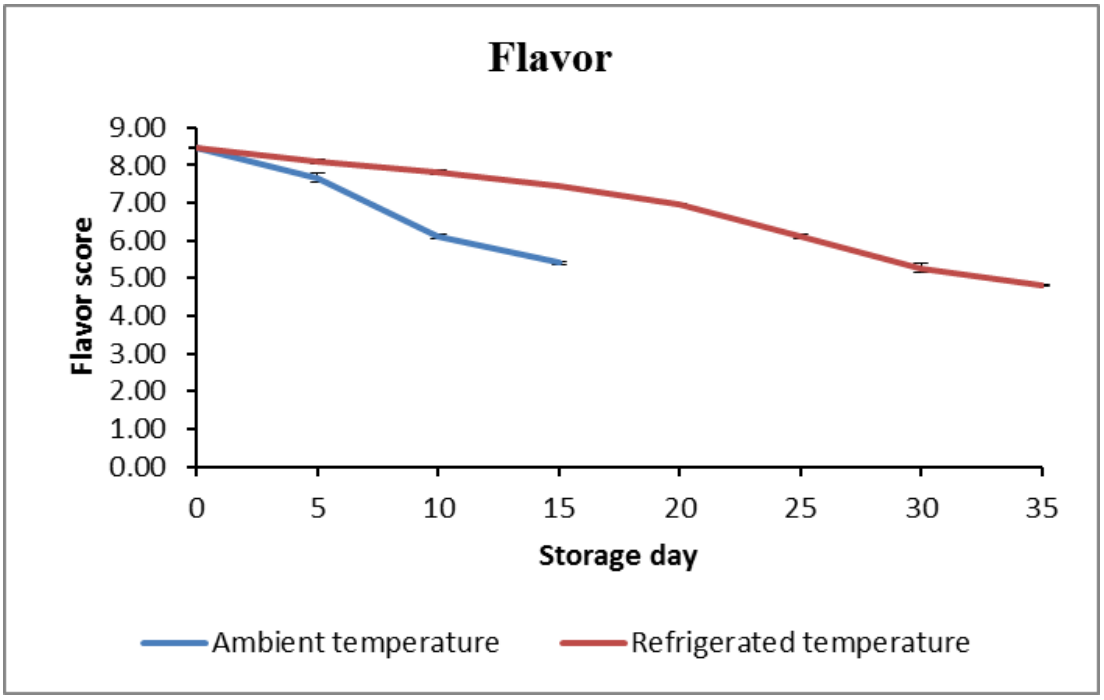

Figure 2 Effect of storage on flavor at ambient and refrigerated temperature

During storage, *danadar* undergoes various sensory, chemical and microbial changes which tend to affect the taste and smell of the product. The initial flavor score of *danadar* was 8.47±0.03 at both ambient and refrigerated temperature and decreased to 5.40±0.06 and 4.80±0.03 in 15th and 35th days of storage, respectively. Flavor score for cow milk *danadar* decreased significantly (P<0.05) throughout the storage period as shown in Table 2.

Body and Texture

Table 2 and **Figure 3** depicts that the body and texture score of *danadar* decreases with the increase in storage period, probably due to evaporation of moisture during storage. The decrease in the body and texture score was more in the sample stored at 30˚C than that of the samples stored at 7˚C. The body and texture of spoiled *danadar* was described as sandy, hard, coarse, gritty and dry surface towards the end of storage.

The initial body and texture score of *danadar* was 8.93±0.03 at both ambient and refrigerated temperatures, which decreased to 5.23±0.12 and 4.83±0.04 on 15th and 35th days of storage, respectively. The body and texture scores of *danadar* declined with the advancement of storage period regardless whether it was stored at ambient or refrigeration temperature. The body and texture scores were also decreased significantly (P<0.05) with storage as shown in Table 2.

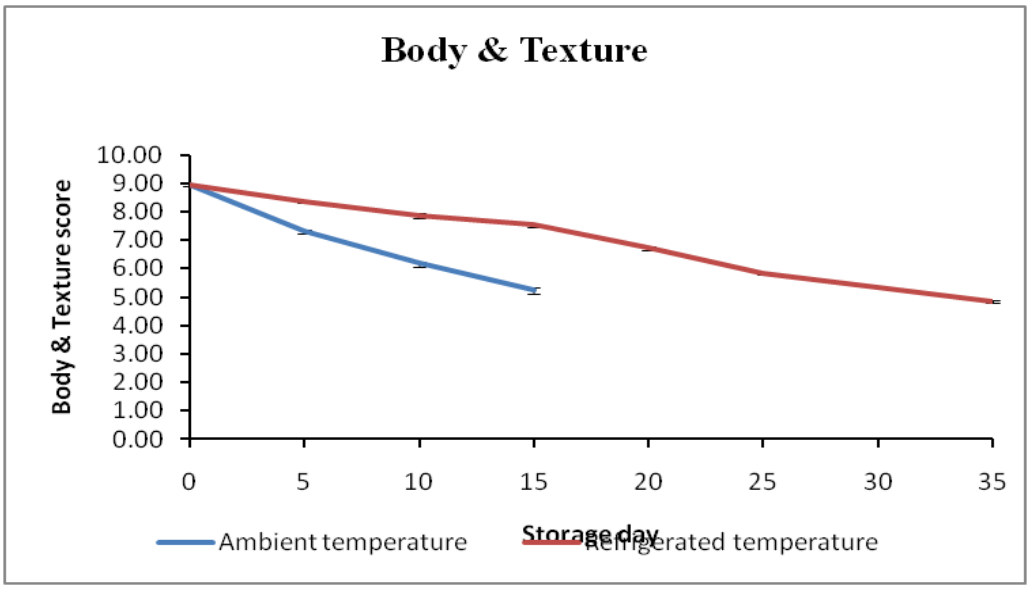

Figure 3 Effect of storage on body & texture at ambient and refrigerated temperature

Overall acceptability

Tables 2 and **Figure 4** depicts that the overall acceptability score of *danadar* decreases gradually with the increase in storage period, probably due to expulsion of moisture during storage, development of acidity, oxidation of fat and growth of microorganism.

A higher reduction of the score was observed in the samples stored at 30˚C, whereas a lower reduction was found at refrigerated temperature. The initial overall acceptability score of *danadar* was 8.47±0.03 at both ambient and refrigerated temperatures decreased to 5.10±0.10 and 4.38±0.06 on 15th and 35th days of storage, respectively. The overall acceptability scores decreased with the increase in storage, regardless of temperature. The overall acceptability scores were also decreased significantly ($P<0.05$) with storage as shown in Table 2.

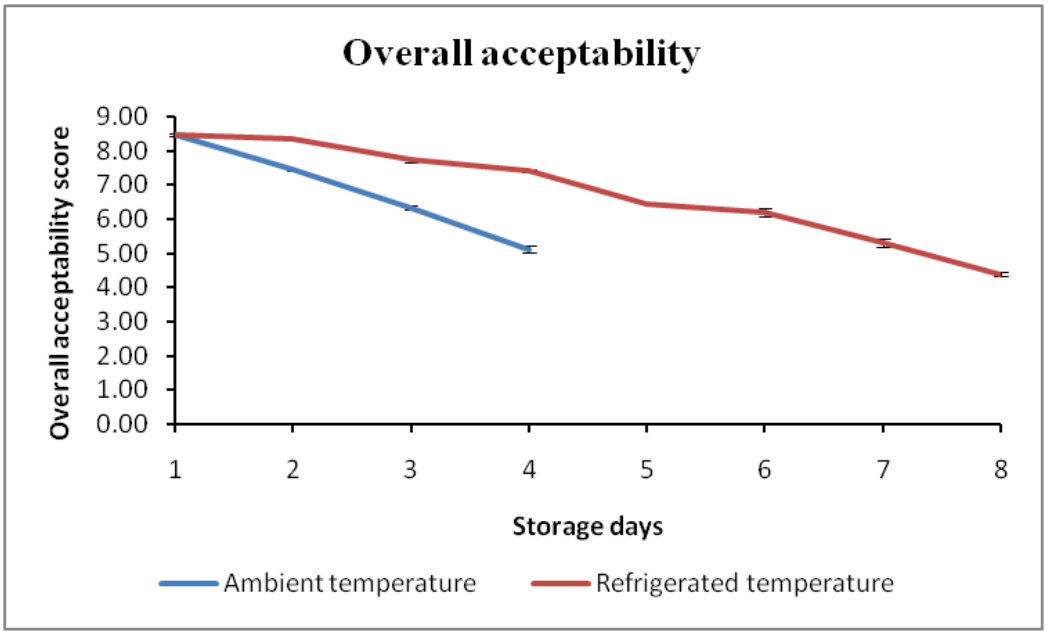

Figure 4 Effect of storage on overall acceptability at ambient and refrigerated temperature

Chemical changes

The chemical analysis of *danadar* samples stored at ambient and refrigerated temperatures were performed in laboratory and their chemical profiles such as moisture, titratable acidity, free fatty acids and peroxide value (PV) are placed in **Table 3** and discussed hereunder.

Table 3 Effect of storage at ambient and refrigerated temperatures on chemical attributes of cow milk *danadar*

Storage Day	Moisture (%)		Free fatty acid (% Oleic acid)		Titratable acidity (% LA)		Peroxide value (mmol/kg)	
	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature
0	29.83 ± 0.44^{a}	29.83 ± 0.44^{a}	5.10 ± 0.01^{d}	5.10 ± 0.01^{h}	0.07 ± 0.002^{c}	0.07 ± 0.002^{d}	0.07 ± 0.003^{d}	0.07 ± 0.003^{h}
5	26.33 ± 0.17^{Bb}	28.50 ± 0.29^{Ab}	5.22 ± 0.01^{Ac}	5.15 ± 0.01^{Bg}	0.08 ± 0.000^{bc}	0.08 ± 0.001^{d}	0.19 ± 0.003^{Ac}	0.14 ± 0.007^{Bg}
10	23.00 ± 0.29^{Bc}	27.50 ± 0.29^{Abc}	5.45 ± 0.01^{Ab}	5.25 ± 0.01^{Bf}	0.11 ± 0.009^{ab}	0.08 ± 0.006^{d}	0.28 ± 0.003^{Ab}	0.19 ± 0.003^{Bf}
15	19.83 ± 0.44^{Bd}	26.50 ± 0.50^{Acd}	5.67 ± 0.07^{Aa}	5.28 ± 0.02^{Be}	0.12 ± 0.014^{a}	0.09 ± 0.003^{cd}	0.55 ± 0.007^{Aa}	0.33 ± 0.010^{Be}
20		25.50 ± 0.29^{d}		5.42 ± 0.01^{d}		0.10 ± 0.006^{c}		0.44 ± 0.007^{d}
25		24.17 ± 0.17^{e}		5.55 ± 0.01^{c}		0.12 ± 0.007^{b}		0.66 ± 0.007^{c}
30		23.83 ± 0.44^{e}		5.62 ± 0.01^{b}		0.13 ± 0.006^{ab}		0.96 ± 0.009^{b}
35		20.83 ± 0.44^{f}		5.75 ± 0.00^{a}		0.13 ± 0.003^{a}		1.07 ± 0.009^{a}

a,b,…,h: means ± SE with different superscript within a column differ significantly (P<0.05)
A,B: means ± SE with different superscript within a row differ significantly (P<0.05)

Moisture

The changes in moisture content of *danadar* samples from cow milk during storage are presented in Table 3 and Figure 5. It is evident from the table that *danadar* stored at refrigerated temperature had a better shelf-life than that at ambient temperature. In the sample, as expected the moisture decreased to 19.83±0.44 and 20.83±0.44 at ambient and refrigerated temperatures, respectively. After 15th and 35th days the samples became hard at ambient and refrigerated temperatures, respectively and became unacceptable for testing. The moisture content scores were also decreased significantly (P<0.05) with storage as shown in Table 3. Thus, it can be suggested that the *danadar* from cow milk can be stored for 15th days at ambient temperature and 35th days at refrigerated temperature.

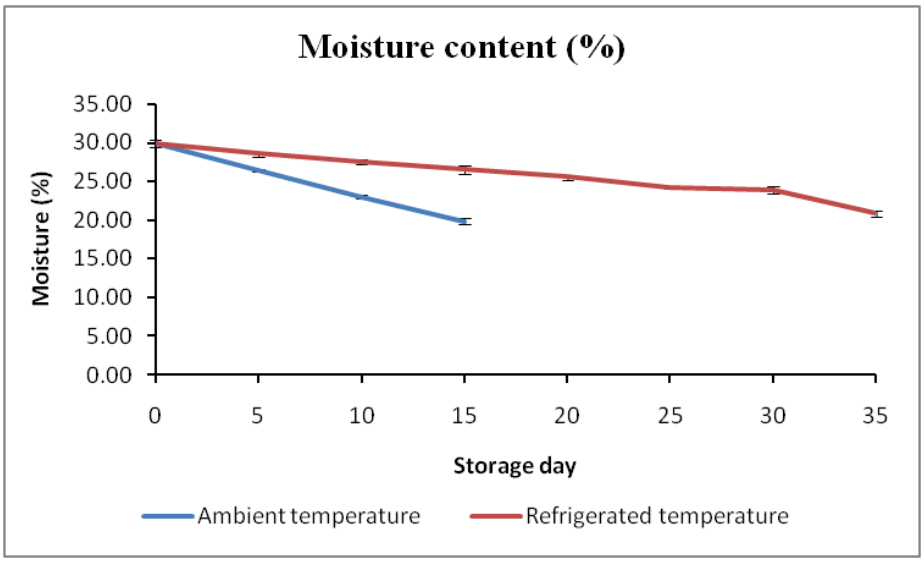

Figure 5 Effect of storage on moisture at ambient and refrigerated temperature

Titratable acidity (as % lactic acid)

The changes in titratable acidity of *danadar* prepared from cow milk during storage are shown in Table 3 and **Figure 6**. The table indicates that the refrigerated samples could be stored for longer period than that at ambient temperature. The TA for cow milk *danadar* samples were increased to 0.12±0.014 and 0.13±0.003 at ambient and refrigerated temperatures in 15th and 35th days, respectively. The initial count 0.07±0.002 of *danadar* prepared from cow milk increased to 0.12±0.014 on 15th day at ambient temperature. Similar trend but at a lower rate was observed in the refrigerated temperature. The refrigerated samples registered less increase than at ambient temperature. The TA was also increased significantly (P<0.05) with storage as shown in Table 3. Thus, it may be concluded that after 15th and 35th days of storage at ambient and refrigerated temperatures, respectively *danadar* develops acidic flavor which makes the product unsuitable for consumption. Sen and Rajorhia (1990) also reported significant increase in acidity of full fat soft grade *sandesh* during storage [6].

According to Amarita *et al.* (2001) significant increase in acidity may be due to the conversion of lactose and other sugars present in milk to lactic acid and other acids by starter culture [7].

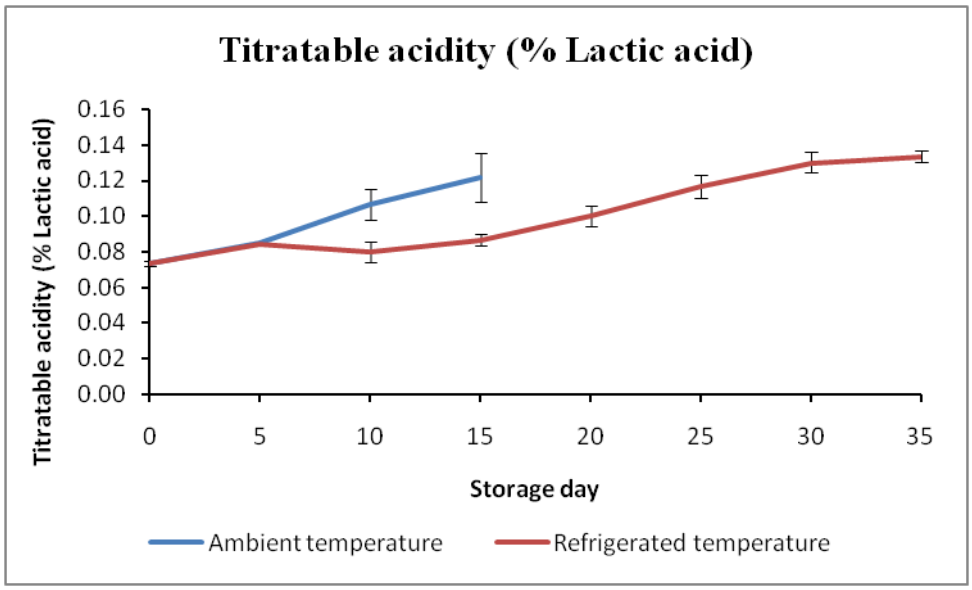

Figure 6 Effect of storage on titratable acidity at ambient and refrigerated temperature

Free Fatty acids (as % oleic acid)

The changes in free fatty acids content of *danadar* prepared from cow milk during storage are illustrated in Table 3 and **Figure 7**. Results reveals that FFA content of *danadar* stored at ambient temperature increased more sharply than that at refrigerated temperature. The FFA content was 5.10±0.01 on first day at both ambient and refrigerated temperatures, which gradually increases to 5.67±0.07 and 5.75±0.00 on 15th and 35th days, respectively at ambient and refrigerated temperatures, respectively.

The results indicate that the FFA content of *danadar* increased with increase in storage periods irrespective of temperature. The FFA were also increased significantly ($P<0.05$) with storage as shown in Table 3.

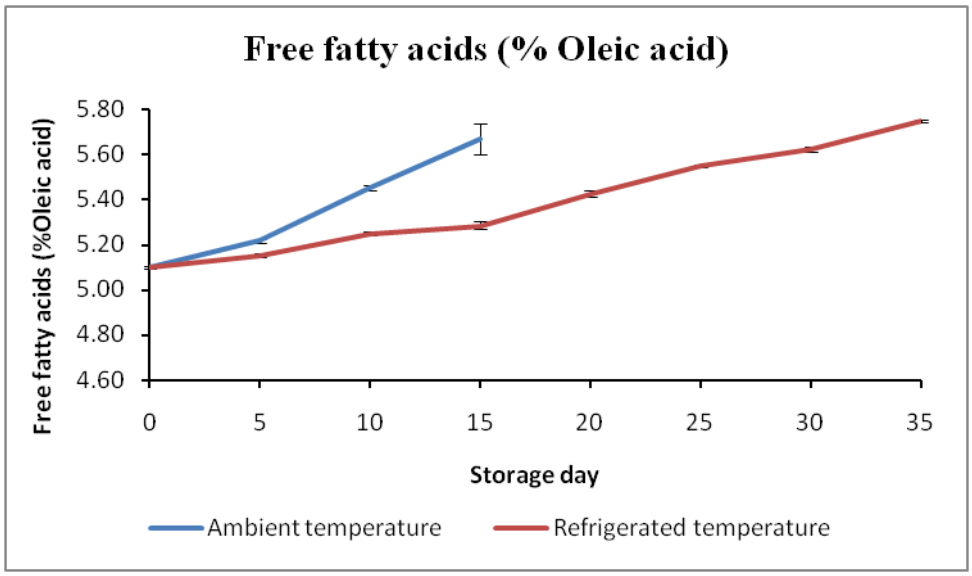

Figure 7 Effect of storage on Free fatty acid at ambient and refrigerated temperature

Peroxide value

Peroxide value (PV) is a measure for autoxidation of lipids in the food system. The higher PV signifies a greater accumulation of oxidative product as a result of progressive oxidation. Therefore, with a view to evaluate the oxidative deterioration during processing and storage, the PV of samples was determined. The changes in PV of

danadar prepared from cow milk during storage are shown in Table 3. The fresh sample had initial PV value of 0.07±0.003 which increased to 0.55±0.007 and 1.07±0.009 at the end of 15th and 35th days, when stored at ambient and refrigerated temperatures, respectively. From the view point of keeping quality of *danadar*, it can be concluded that storage at refrigerated temperature produced better results than that of ambient temperature. The peroxide values were increased significantly ($p<0.05$) with storage as shown in Table 3 and **Figure 8**. Thus, it may be concluded that after 15th and 35th days of storage at ambient and refrigerated temperature, respectively; *danadar* develops oxidized flavor which makes the product unsuitable for consumption.

Microbiological changes

The microbiological quality of *danadar* samples indicates towards the hygienic practices that were adopted during production of milk, preparation of *danadar* and storage. The ANOVA data are presented in **Table 4**.

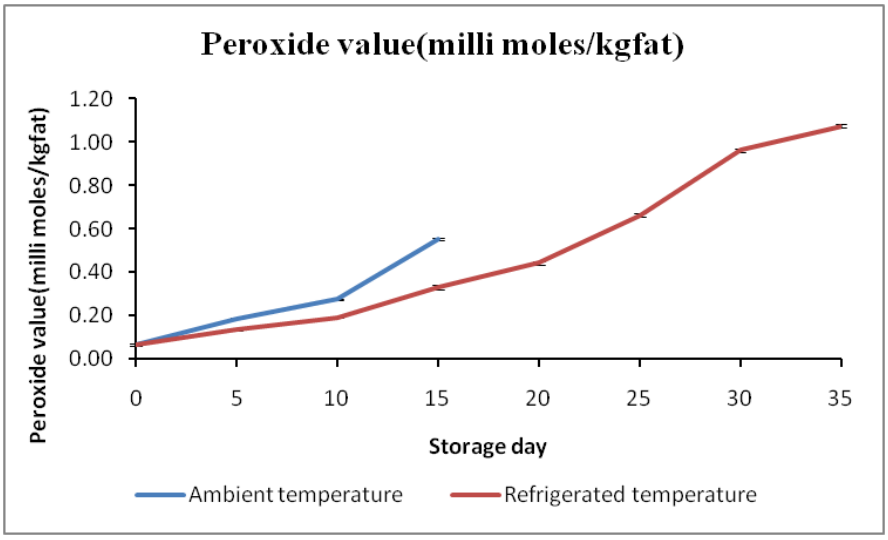

Figure 8 Effect of storage on Peroxide value at ambient and refrigerated temperature

Table 4 Effect of storage at ambient and refrigerated temperatures on microbiological attributes of cow milk *danadar*

Storage Day	Total viable count (log cfu/g)		Yeast and mold count (log cfu/g)		Coliform count (log cfu/g)		*Staphylococcus* count (log cfu/g)	
	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature	Ambient temperature	Refrigerated temperature
0	2.10 ± 0.006^{d}	2.10 ± 0.006^{h}	1.18 ± 0.009^{d}	1.18 ± 0.009^{h}	0.00 ± 0.000^{d}	0.00 ± 0.000^{h}	0.00 ± 0.000^{d}	0.00 ± 0.000^{h}
5	2.40 ± 0.012^{c}	2.27 ± 0.015^{g}	1.50 ± 0.009^{Ac}	1.31 ± 0.007^{Bg}	0.33 ± 0.019^{Ac}	0.17 ± 0.015^{Bg}	0.32 ± 0.012^{Ac}	0.11 ± 0.007^{Bg}
10	2.67 ± 0.015^{b}	2.39 ± 0.007^{f}	1.89 ± 0.012^{Ab}	1.45 ± 0.012^{Bf}	0.58 ± 0.012^{Ab}	0.27 ± 0.015^{Bf}	0.60 ± 0.006^{Ab}	0.26 ± 0.018^{Bf}
15	3.18 ± 0.027^{Aa}	2.64 ± 0.021^{Be}	2.15 ± 0.009^{Aa}	1.57 ± 0.015^{Be}	0.89 ± 0.009^{Aa}	0.40 ± 0.006^{Be}	0.94 ± 0.006^{Aa}	0.34 ± 0.006^{Be}
20		2.79 ± 0.009^{d}		1.76 ± 0.007^{d}		0.55 ± 0.015^{d}		0.52 ± 0.015^{d}
25		2.97 ± 0.015^{c}		1.89 ± 0.012^{c}		0.68 ± 0.015^{c}		0.64 ± 0.006^{c}
30		3.10 ± 0.006^{b}		2.14 ± 0.019^{b}		0.89 ± 0.009^{b}		0.83 ± 0.012^{b}
35		3.28 ± 0.015^{a}		2.25 ± 0.012^{a}		1.12 ± 0.009^{a}		0.98 ± 0.012^{a}

a,b,…,h: means ± SE with different superscript within a column differ significantly ($P<0.05$)
A,B: means±SE with different superscript within a row differ significantly ($P<0.05$)

Total viable count

A Table 4 and **Figure 9** indicates the TVC data and indicates that it increases with the increase in storage period at both ambient and refrigeration temperatures. TVC of optimized *danadar* was found to be acceptable up to 15th and

35th days, stored at ambient temperature and refrigerated temperatures, respectively. The fresh sample had initial TVC were 2.10 ± 0.006 and 2.10 ± 0.006 which increases to 3.18 ± 0.027 and 3.28 ± 0.015 at the end of 15th and 35th days when stored at ambient and refrigerated temperature, respectively.

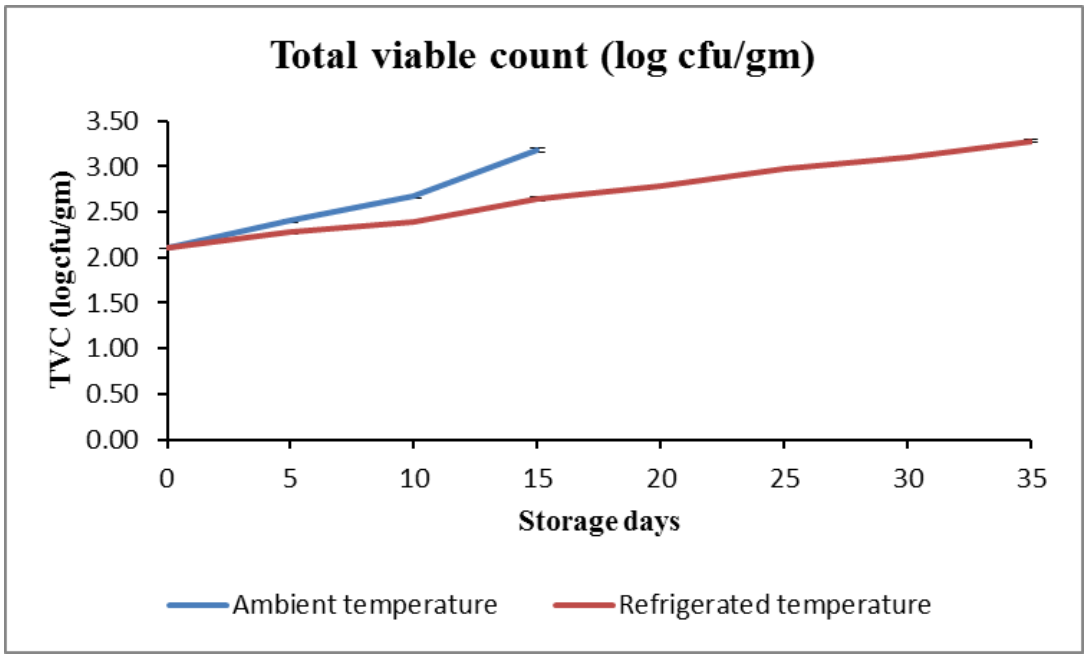

Figure 9 Effect of storage on total viable count at ambient and refrigerated temperature

The TVC were also increased significantly (P<0.05) with storage as shown in Table 4. Thus, it may be concluded that after 15th and 35th days of storage at ambient and refrigerated temperature, respectively the TVC increase in *danadar* up to upper limits, which make unsuitable for consumption. The increase of TVC in *rasogolla* is reported by Singh *et al*. (2007)[8], but was in contrast with those reported by Arora *et al.* (1996)[9]. Prabha (2006), reported that significant increase in total viable count during storage of dietetic *burfi* [10]. Sen and Rajorhia (1990) reported that increase in sugar level of *sandesh* reduces microbial proliferation in the product . They observed that as sugar level was increased, standard plate count significantly decreased.

Yeast and Mold count

Table 4 and **Figure 10** depict the yeast and mold count of *danadar*. The count increases with the progress of storage. The fresh sample had initial yeast and mold count was 1.18 ± 0.009 which increases to 2.15 ± 0.009 and 2.25 ± 0.012 at the end of 15th and 35th days when stored at ambient and refrigerated temperatures, respectively. The increase in yeast and mold count was slow at refrigerated temperature but after 35th days it became unacceptable on sensory basis. The yeast and mold counts were also increased significantly (P<0.05) with storage as shown in Table 4. Such increase of yeast and mold in *rasogolla* was also reported by Singh *et al*. (2007) [8]. Fleet (1990) and Rohm *et al.* (1992) stated that low pH of *yogurt* and fermented milk provides a selective environment for the growth of yeast [8, 11,12]. It was reported that the low pH, nutritional profile, surface moisture, presence of lactic acid, peptides and amino acids helps in rapid growth of yeast in cheese (Ledenbach and Marshall, 2009). The presence of oxygen and low pH favors the growth of mold (Ledenbach and Marshall, 2009) [13].

Coliform count

From Table 4 and **Figure 11**, it was observed that *danadar* samples were found to be acceptable up to 15th and 35th days, stored at ambient and refrigerated temperatures. The initial coliform count was absent in freshly prepared *danadar* which increases to 0.89 ± 0.009 and 1.12 ± 0.009 at the end of 15th and 35th days, when stored at ambient and refrigerated temperatures, respectively. Coliform count at both ambient and refrigerated temperatures was found to increase with the increase in storage period. Coliform score of optimized *danadar* stored at refrigerated temperature was found to be acceptable up to 35th days as compared to 15th days stored at ambient temperature. The coliform counts were also increased significantly (P<0.05) with storage as shown in Table 4.

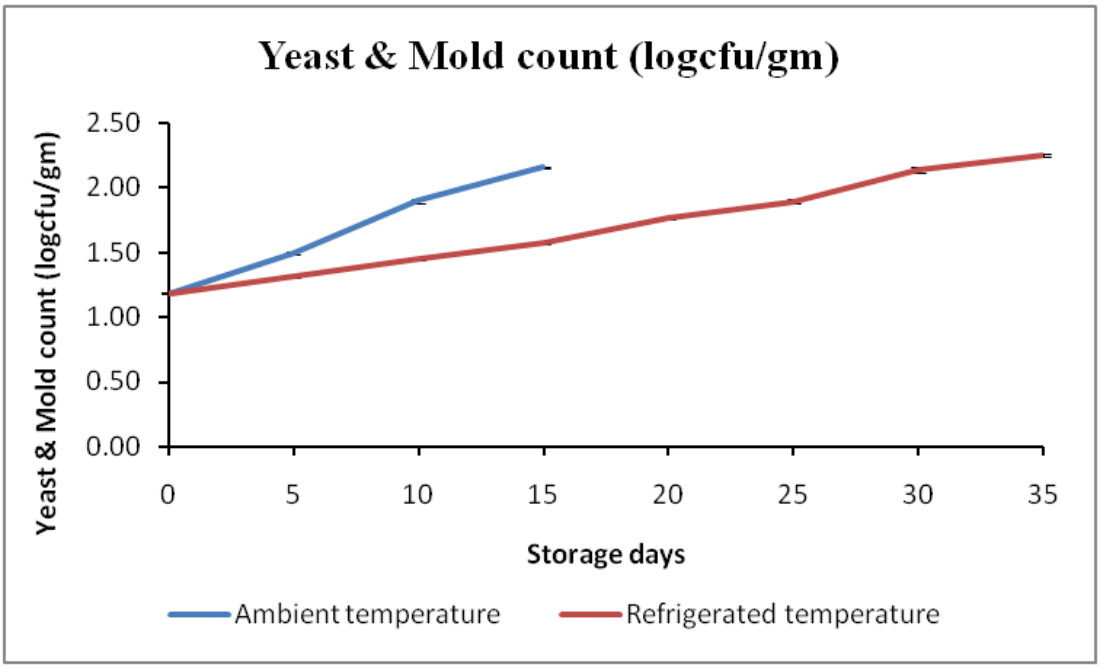

Figure 10 Effect of storage on yeast & mold count at ambient and refrigerated temperature

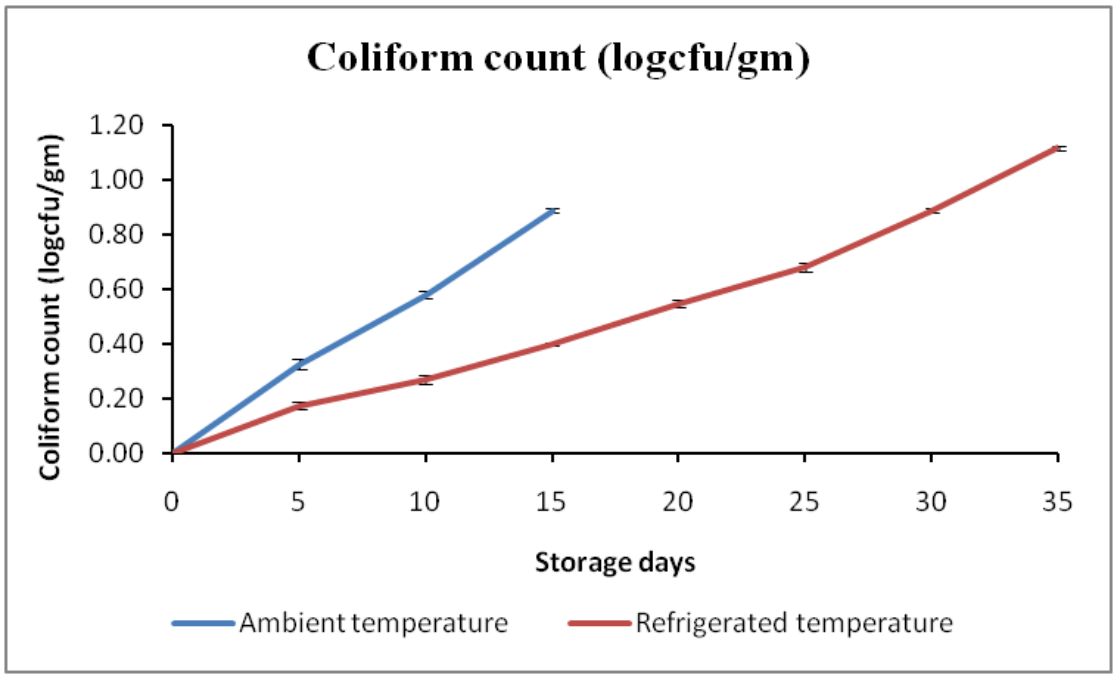

Figure 11 Effect of storage on coliform count at ambient and refrigerated temperature

Staphylococcus count

From Table 4 and **Figure 12**, it was found that the Staphylococcus count at both ambient and refrigerated temperatures was found to increase with the increase in storage period. The staphylococcus count was absent in freshly prepared *danadar* from cow milk, which increased to 0.94 ± 0.006 and 0.98 ± 0.012 at the end of 15^{th} and 35^{th} days when stored at ambient and refrigerated temperatures, respectively. Staphylococcus count of optimized *danadar* stored at refrigerated temperature was found to be acceptable up to 35^{th} days as compared to 15^{th} days for *danadar* stored at ambient temperature. The staphylococcus counts were also increased significantly ($P<0.05$) with storage both at ambient and refrigerated temperatures as shown in Table 4. Bhattacharya and Desraj (1980a) and Soni *et al.* (1980) recommended refrigerated temperature which ranged from 4-6˚C and 8-12˚C for storage of *rasogolla* prepared from cow and buffalo milk respectively [14,15]. Few others suggested storage at room temperature for both cow and buffalo milk *rasogolla* (Kundu and De, 1972 and De, 1980)[16,17] .

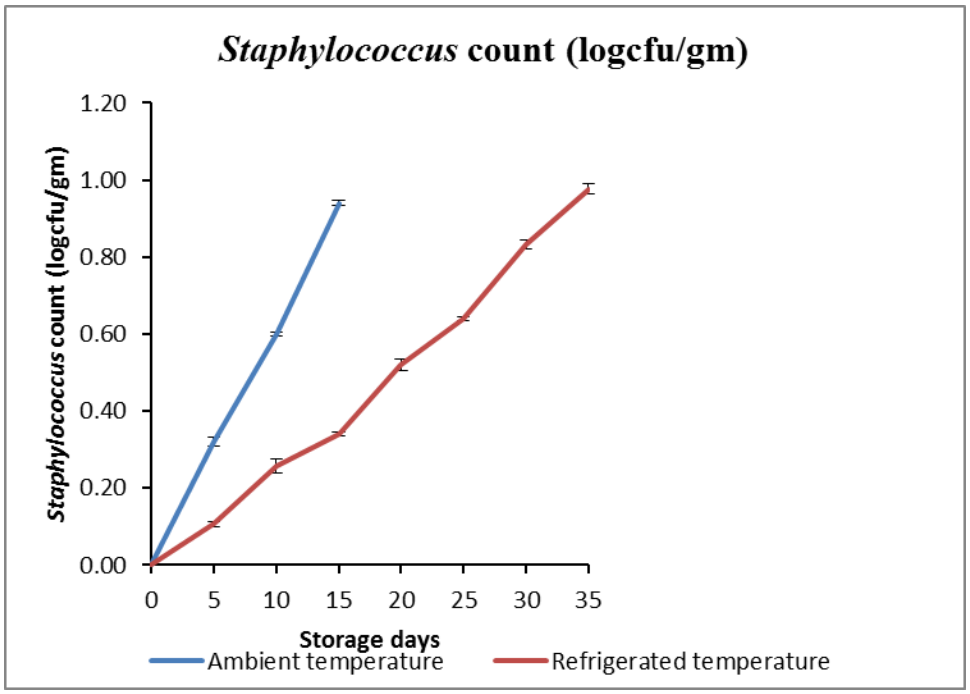

Figure 12 Effect of storage on staphylococcus count at ambient and refrigerated temperature

Conclusion

Scores for all the sensory attributes of the prepared cow milk *danadar* decreased significantly (P<0.05) throughout the storage period. The moisture content of the sample also decreased significantly (P<0.05) with progress of storage period. The titratable acidity (percent lactic acid), free fatty acids (percent oleic acid), and peroxide values of *danadar* were significantly (P<0.05) higher at the end of storage period from the initial value obtained on 0 day. After 15th and 35th days of storage at ambient and refrigerated temperatures, respectively, *danadar* samples developed oxidized flavor rendering the product unsuitable for consumption.

The total viable, yeast mold, coliform and staphylococcal counts of the samples also increased significantly (P<0.05) as the period of storage advanced. It may be concluded that after 15th and 35th days of storage at ambient and refrigerated temperatures, respectively, all the above mentioned microbial counts in *danadar* increased to a level which made the product unsuitable for consumption.

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