Assiut J. Agric. Sci., (50) No. (2) 2019 (38-52) *ISSN: 1110-0486*
Website: www.aun.edu.eg/faculty_agriculture/journals_issues_form.php *E-mail: ajas@aun.edu.eg*

Evaluate the Chemical and Microbiological Quality of Laban Rayeb Manufactured

Ahmed, Hanan A.; Y.H. Shahein ; M.A. Mohran and A.A. Tammam

Dairy Science Department, Fac. of Agric., Assiut Univ.

Received on: 14/3/2019 **Accepted for publication on:** 21/3/2019

Abstract

Laban rayeb manufactured under a good sanitation and hygiene conditions from lactic acid bacteria isolated, from Laban Rayeb Produced by small dairy plant in Assuit city, Cow's milk heat treated at 73 °C and cooled to 37 °C were inoculated by either isolated Lactobacillus sp or Streptococci sp culture or mixture of them at 1: 1 by weight, to produce a Laban Rayeb in sterile laboratory conditions. The produced Laban Rayeb analyzed as fresh and during period stored for 15 days at 5 ± 2 ° C. The mean acidity, total solids, total nitrogen and soluble nitrogen content in control Laban Rayeb were of 0.7, 11.36 ,0.44, and 0.112 % on the first day of storage which increased to 0.76, 11.52 ,0.49 and 0.169 % after 15 days of storage respectively .While the mean acidity, total solids, total nitrogen, and soluble nitrogen in the samples of Laban Rayeb made by Streptococci sp were of 0.74, 11.33, 0.44 and 0.114 % on the first day of storage which increased with storage to 0.95, 12.22, 0.61 and 0.160 % after 15 days. While these Acidity, Total solid, total nitrogen and soluble nitrogen values of Laban Rayeb inoculated by Lactobacillus sp were 0.76, 11.16, 0.45 and 0.103 %, at first day of storage, which increased to 0.96, 11.75, 0.59, and 146% after 15 days of storage respectively. The Laban Rayeb produced using Lactobacillus sp and Streptococci sp gave the following values 0.84, 11.36, 0.42 and 0.123% respectively and by increasing the storage period these values acidity, total solids, total nitrogen and soluble nitrogen values were increased to reach 1.2, 11.9, 0.55 and 0.192% after 15 days of storage respectively. The total bacterial count values in control Laban Rayeb, Laban Rayeb made by single Streptococci sp, by single Lactobacilli *sp* and by mixed Lactobacillus sp and Streptococci sp respectively were of 5.12, 6.21, 6.27, 6.29 log (cfu/ml) on the first day of storage and increased to 8.87, 9.13, 9.20 , 8.64 log (cfu/ml) after 15 days of storage. While The mean Logarithm of lactic acid bacteria of Lactobacilli sp. count values in control Laban Rayeb, Laban Rayeb produced by Streptococci sp, Lactobacilli sp and Lactobacillus sp and Streptococci sp were of 5.22, 5.46, 7.14, 7.15 log (cfu/ml) on the first day of storage and increased to 7.73, 8.13, 9.22, 9.46 log (cfu/ml) after 15 days of storage , The mean Logarithm of Streptococci sp. values in control Laban Rayeb, Laban Rayeb produced by Streptococci sp, Lactobacilli sp and Lactobacillus sp mixed with Streptococci sp were of 4.86, 6.93, 4.12, 7.15 log (cfu/ml) on the first day of storage and increased to 7.42, 9.98, 8.17, 8.76 log (cfu/ml) after 15 days of storage, The mean Logarithm count of lactic acid bacteria of proteolytic bacteria values in control Laban Rayeb, Laban Rayeb made by Streptococci sp, Lactobacilli sp and mixed of Lactobacillus sp and Streptococci sp were 1.61, 3.54, 3.18, 3.32 log (cfu/ml) on the first day of storage which in-

creased to 5.34, 6.45, 6.56, 6.75 log (cfu/ml) after 15 days of storage . Molds and yeasts and coliform bacteria were not detected.

***Keywords**: Manufactured Laban Rayeb, Chemical and Microbiological Quality.*

Introduction

The fermented of dairy foods presents one of the oldest methods of long-term food preservation, traditional Egyptian fermented milk products Laban Rayeb and Laban Khad, the traditional of fermenting milk was spread throughout the east Europe and Russia by the tartars, Huns and Mongols during their conquests (Vasilyevich and Shah, 2008).

Utilization of fermented milk is also claimed to improve the digestability of milk constituents, useful in lactose intolerance, as well as being greatly beneficial in controlling all types of intestinal disorders. As well as, during fermentation, the lactic acid cultures produce intermediate metabolites such as antibiotics, anticarcinogenic compounds, anticholesteric compounds and enzymes with the result that the fermented products may not only enhance nutritional quality, but also therapeutic values (Varnam and Sutherland, 1994).

The manufacturing process of the Egyptian fermented dairy products was goes back to the pharaonic period (Abou-Donia, 2008). Laban Rayeb (skimmed sour milk) considered as dairy by-products is a type of fermented milk manufactured in Egyptian villages. After milking, earthenware shallow pot (mattered) filled with milk, is kept in dark room for 12-24 h, in hot seasons, and about 24-72 days in cold seasons. This period is sufficient to coagulate the milk and to form the cream layer on the surface. When the weather is too cold the mattered is warmed to enhance milk curdling. Laban Rayeb is used raw or for manufacture of karish cheese or to consume directly as a fermented milk (El-Gendy, 1983). Laban rayeb is one of the fermented dairy milk which widely consumed in Egypt. It is made through natural lactic acid fermentation of buffalo's and /or cow's milk (Abd-El Hamid *et al*., 2008). This study was conducted to determine the chemical and microbiological properties of manufactured Laban Rayeb under a highly sanitation and hygiene condition.

Material and Methods

36 samples of Laban Rayeb were collected from different 12 small plants in Assiut city; all samples were immediately kept under aseptic conditions to Isolate lactic acid bacteria groups using M17 and MRS agar media and the plates were incubated at 37 C for 48 h under anaerobic conditions according to Belitz *et al.,* (2004) and Guesses and Kihal, (2004). Twenty-five Colonies were randomly selected and streak plating was then used to purify the strains according to Mathara *et al*., (2004). All isolates were initially tested for Gram stain, catalase test, according to (Harrigan and McCance, 1976). Reaction in litmus milk medium by LAB, the development of the color of curd (white, pink, blue, and purple) after incubation at 37 C_Manufactured Rayeb milk at controlled conditions. The lactic acid bacteria which isolated from the collected Laban Rayeb produced in the small plant in the city of Assiut were used to manu-

facture Laban Rayeb at controlled conditions. The rod shape isolates, cocci shape isolates and mixture of them at 1: 1 by weight were used as starter culture to make the fermentation of a controlled cow's milk which expose to a heat treatment at 73°C for 15 seconds and cold down to 37 °C. The cold milk was divided into four sections:

Section I: used as control without adding bacterial culture

Section 2: Cocci shape isolate used as starter culture bacteria.

Section 3: Rod shape isolate used as starter culture bacteria.

Section 4: Mixture of cocci shape and rod shape isolates at (1: 1) by weight was used as starter culture.

All previous sections left at room temperature for 24 hours the first day of industrialization is called "Zero Time" The fertilized milk was cured on the first day of manufacture and stored for 15 days. Laban Rayeb under the conditions of sterile laboratory and the final fermented product was analyzed chemically.

Chemical Analysis: Determination of titratable acidity, total solids, moisture, fat content and (total nitrogen, total protein and soluble nitrogen contents using kjeldahl method) were done according to the methods described by A.O.A.O. (2000).

Microbial Analysis: Total Plate Count (T.P.C.) was determined by using the method described by (Marshall, 2004). Lactic Acid Bacteria count counted by using MRS and M17agar medium according to the methods described in the International Standard FIL/IDF 117A (1988).Coliform bacteria was detection broth according to Bradley *et al*. (1992).

Yeasts & Moulds Counts according to the methods described in IDF(1985). Proteolytic bacteria count was determined as described by (Tomas, 1975). Results were evaluated statistically using the software program of the SAS system (SAS, 1999). Differences between means were determined by Duncan's multiple range test at a level of 0.05 probability (Steel & Torrie, 1980).

Statistical analysis

Results were evaluated statistically using the software program of the SAS system (SAS, 1999). Differences between means were determined by Duncan's multiple range test at a level of 0.05 probability (Steel & Torrie, 1980).

Results and Discussion

Titratable acidity: The percentage values titratable acidity of Laban Rayeb manufactured using different type of lactic acid bacteria cultures isolated from local Laban Rayeb collected from small Dairies are presented in Table(1) It was observed that the titratable acidity percentages of fresh Laban Rayeb were 0.70 ± 0.01, 0.74 ± 0.01, 0.76 ± 0.015 and 0.84 ± 0.01 for control, Streptococcus culture, Lactobacillus culture and mixture of both, respectively.It was also noticed that by increasing the storage periods of Laban Rayeb, the percentages of acidity were increased. The rate of increasing acidity in case of using the mixture culture of both (Streptococcus & Lactobacillus) was higher than that of control samples, which reached to 1.2 ± 0.2 after 15 days of storage at 5 ± 2ºC, while the acidity percentages of both Laban

Rayeb with Streptococcus culture and Lactobacillus culture were between them. The acidity increased with the progress in storage periods, due to the action of microorganisms in metabolizing milk components, particularly lactose and citrate into organic acids. Similar results were reported by El-Batawy *et al.*(1987). The development of acidity percentages in control Laban Rayeb samples may be due to the fermentation activity of thermoduric bacteria remain in milk after the heat treatment as Enterococcus spp. as well as some Lactobacillus spp. (Gomah, 1999). These results are in agreement with those of Zedan *et al.* (2003).

Table 1. Changes in acidity percentages of manufactured Laban Rayeb using isolated starter cultures during the storage period at 5 ± 2ºC up to 15 days.

Treatments	Storage periods (days)				Mean
	Fresh	3	10	15	
*Control	0.70 ± 0.01	0.74 ± 0.03	0.83 ± 0.01	0.86 ± 0.01	0.79^{c}
Streptococcus Culture	0.74 ± 0.01	0.86 ± 0.02	0.88 ± 0.00	0.95 ± 0.01	0.86^{b}
Lactobacillus Culture	0.76 ± 0.015	0.82 ± 0.025	0.91 ± 0.010	0.96 ± 0.015	0.89^{b}
Mixture of both	0.84 ± 0.01	0.88 ± 0.01	0.93 ± 0.015	1.2 ± 0.200	0.96^{a}
Mean	0.78^{d}	0.83^{c}	0.88^{b}	0.99^{a}	
*Control (without starter culture addition)					

Total solids contents: The changes in total solids contents of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days are presented in Table 2 From these data it was observed that the total solid content of control sample recorded 11.36 ± 0.02 when fresh time, and with prolongation the storage periods, the total solids contents significantly ($p< 0.05$) increased, which reached to 11.52 ± 0.06 at 15 days of storage at 5 ± 2ºC. On the other hand, the total solids content of fresh Laban Rayeb samples were; 11.33 ± 0.02, 11.16 ± 0.02 and 11.6 ± 0.06 for that of Cocci culture, Rod culture and the mixture of both, respectively. With increasing the storage periods it was noticed that, the total solids contents were increased, which reached to 12.22 ± 0.3, 11.75 ± 0.14 and 11.9 ± 0.01 for Cocci culture, Rod culture and the mixture of both at 15 days of storage, respectively. Gradual increases in total solids were observed during storage owing to the gradual loss of moisture. The obtained results are in good agreement with those of Youssef *et al.,* (1998) and El-Senaity (1999). Abd El-Hamide *et al.* (2008) also found that, the total solids in Laban Rayeb samples were; 9.52-10.50 and 10.15 - 11.07% during winter and summer seasons, respectively. They explained the differences in the total solids contents between summer and winter products by the animal feeding. On the other hand, the obtained results of Zedan *et al*. (2003), who found that the total solids contents in Laban Rayeb at 1 and 15 days of storage to be from; 11.65-12.19 and from 11.80-12.36%, respectively

Table 2. Changes in total solids contents of manufactured Laban Rayeb using isolated starter cultures during the storage period at 5 ± 2ºC up to 15 days.

Treatments	Storage periods (days)				Mean
	Fresh	3	10	15	
Control	11.36 ± 0.02	11.37 ± 0.02	11.45 ± 0.07	11.52 ± 0.06	11.4^{c}
Streptococcus	11.33 ± 0.02	11.34 ± 0.01	11.89 ± 0.02	12.22 ± 0.30	11.7^{b}
Lactobacillus	11.16 ± 0.02	11.26 ± 0.08	11.39 ± 0.05	11.75 ± 0.14	11.4^{c}
Cocci & Rod mixture	11.6 ± 0.06	11.82 ± 0.14	11.84 ± 0.07	11.9 ± 0.01	11.8^{a}
Mean	11.45^{c}	11.36^{d}	11.64^{b}	11.85^{a}	

Moisture contents: The data shown in Table 3 represents the changes in moisture contents of manufactured Laban Rayeb using different isolated starter cultures during the storage periods at 5 ± 2ºC as affected by the addition of starter culture and the storage periods. It was observed that, the moisture contents were; 88.63 ± 0.02, 88.67 ± 0.02, 88.83 ± 0.02 and 88.39 ± 0.06 for; control, Cocci culture, Rod culture and mixture of Cocci & Rod with ratio: 1:1, respectively. Also, it could be observed that with prolongation the storage periods, the moisture contents of all treatments were significantly ($p< 0.05$) decreased until recorded the lowest values at the end of storage periods, which reached to; 88.48 ± 0.06, 87.77 ± 0.3, 88.24 ± 0.14 and 88.1 ± 0.01 for; control, Cocci culture, Rod culture and mixture of Cocci & Rod culture (1:1), respectively. These results are in a good agreement with those of Hamad *et al.* (2013).

Table 3. Changes in moisture contents of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Treatments	Storage periods (days)				Mean
	Fresh	3	10	15	
Control	88.63 ± 0.02	88.62 ± 0.02	88.55 ± 0.07	88.48 ± 0.06	88.6^{a}
Streptococcus	88.67 ± 0.02	88.65 ± 0.01	88.1 ± 0.02	87.77 ± 0.30	88.3^{b}
Lactobacillus	88.83 ± 0.02	88.64 ± 0.08	88.60 ± 0.05	88.24 ± 0.14	88.6^{a}
Cocci & Rod mixture	88.39 ± 0.06	88.17 ± 0.14	88.15 ± 0.07	88.1 ±0 .01	88.2^{c}
Mean	88.54^{b}	88.63^{a}	88.35^{c}	88.15^{d}	

The total nitrogen: The total nitrogen of Laban Rayeb manufactured using isolated culture with different types are showed in Table 4. It was found that, the percentages of total nitrogen in the fresh Laban Rayeb samples were; 0.44 ± 0.01, 0.44 ± 0.0, 0.45 ± 0.0 and 0.42 ± 0.01 for; control, Cocci culture, Rod culture and mixture of both Cocci & Rod culture (1:1), respectively. Also, it was noticed that by increasing the storage periods of Laban Rayeb, the total nitrogen percentages was significantly ($p< 0.05$) increased. The increasing of total nitrogen in case of using the Cocci culture and Rod culture as individual culture were higher than that of the control samples and Cocci & Rod mixture, which reached to; 0.52 ± 0.0 and 0.52 ± 0.03, respectively at the end of storage period. These results are in agreement with those of Hamad *et al*. (2013).

Table 4. Changes in total nitrogen contents of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Treatments	Storage periods (days)				Mean
	Fresh	3	10	15	
Control	0.44 ± 0.01	0.45 ± 0.00	0.48 ± 0.01	0.49 ± 0.00	o.47[c]
Streptococcus	0.44 ± 0.00	0.47 ± 0.00	0.48 ± 0.01	0.52 ± 0.00	0.48[a]
Lactobacillus	0.45 ± 0.00	0.47 ± 0.00	0.48 ± 0.00	0.52 ± 0.03	0.48[a]
Cocci & rod mixture	0.42 ± 0.01	0.45 ± 0.00	0.48 ± 0.02	0.51 ± 0.01	0.46[b]
Mean	0.44[d]	0.46[c]	0.48[b]	0.51[a]	

The total protein: The changes in total protein contents of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days are presented in Table 5. From these data, it could be observed that the total protein content of control samples recorded 2.8 ± 0.11 at fresh samples, and with increasing the storage periods, the total protein contents increased which reached to 3.1 ± 0.03 at the end of storage at 5 ± 2ºC. On the other hand the total protein content in the fresh Laban Rayeb were; 2.8 ± 0.05, 2.9 ± 0.03 and 2.7 ± 0.06 for Cocci culture, Rod culture and the mixture of both, respectively. Also, it could be noticed that with increasing the storage periods, the total protein contents were increased, which reached to 3.3 ± 0.03, 3.3 ± 0.2 and 3.3 ± 0.07 for Cocci culture, Rod culture and the mixture of both at the end of storage, respectively. Statistical analysis revealed that, the differences between the averages were significant at ($p< 0.05$). These results are in agreement with those of Mohran and Said (1988), who found that the average of protein contents were 3.29 and 3.32% for commercial and household Algerian fermented milk, respectively. A higher average was reported by Olasupo and Azeez (1992), who found that the average of protein content in Nigerian cultured milk (Nono) was 4.7%. This value was found by Abd Alla (2004), who revealed that it ranged from 4.10 to 4.98% with an average of 4.57 ± 0.24%. Similar findings were reported all protein contents of the examined samples by Zedan *et al.* (2003) and Abou-Dobara *et al.* (2016).

Table 5. Changes in total protein contents of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Treatments	Storage period (days)				Mean
	0	3	10	15	
Control	2.8±0.11	2.9±0.03	3.0±0.06	3.1±0.03	2.99[c]
Streptococcus	2.8±0.05	2.9±0.04	3.0±0.09	3.2±0.03	3.06[a]
Lactobacillus	2.9±0.03	2.9±0.03	3.0±0.03	3.3±0.2	3.06 [a]
Cocci & Rod mixture	2.7±0.06	2.8±0.04	3.1±0.13	3.2±0.07	2.93[b]
Mean	2.8[d]	2.9[c]	3.06[b]	3.2[a]	

The soluble nitrogen: Data tabulated in Table 6 shows the changes occurred in soluble nitrogen contents of manufactured Laban Rayeb using isolated starter cultures during the storage period at 5 ± 2ºC up to 15 days. From these data, it could be observed that the soluble nitrogen percentages were recorded; 0.112 ± 0 .01, 0.114 ± 0.00, 0.103 ± 0.00 and 0.123 ± 0.01% of fresh samples for; control, Streptococcus, Lactobacillus and the mixture of both, respectively. Also, it could be observed that with increasing the storage periods, the soluble nitrogen contents were increased significant at ($p< 0.05$), which reached to 0.169 ± 0.00, 0.160 ± 0.00, 0.164 ± 0.03 and 0.192 ± 0.01 for; control, Streptococcus, Lactobacillus and the mixture of both at the end of storage periods, respectively. The increasing of soluble nitrogen value of control samples may be attributed to the proteolytic activity of thermoduric bacteria of used heated milk. The obtained results are in agreement with those of Abd El-Hamid *et al.* (2008), who found the soluble nitrogen contents in Rayeb milk to be in the range from 0.112 to 0.152%.

Table 6. Changes in soluble nitrogen contents of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Treatments	Storage periods (days)				Mean
	Fresh	3	10	15	
Control	0.112 ± 01	0.143 ± 0.00	0.167 ± 0.01	0.169 ± 0.00	o.148[b]
Streptococcus	0.114 ± 0.00	0.143 ± 0.00	0.157 ± 0.01	0.160 ± 0.00	0.143[c]
Lactobacillus	0.103 ± 0.00	0.124 ± 0.00	0.157 ± 0.00	0.164 ± 0.03	0.137[d]
Cocci & Rod mixture	0.123 ± 0.01	0.166 ± 0.00	0.177 ± 0.02	0.192 ± 0.01	0.165[a]
Mean	0.113[d]	0.144[c]	0.156[b]	0.171[a]	

Fat contents: The changes in fat contents of manufactured Laban Rayeb using isolated starter cultures during the storage period at 5 ± 2ºC up to 15 days are presented in Table 7. The statistical analysis of these data revealed that, there is no significant different between all treatments. On the other hand, the obtained results are lower than the results obtained by Zedan *et al.* (2003).

Table 7. Changes in fat contents of manufactured Laban Rayeb using isolated starter cultures during the storage period at 5 ± 2ºC up to 15 days.

Treatments	Storage periods (days)				Mean
	Fresh	3	10	15	
Control	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6[a]
Streptococcus	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6[a]
Lactobacillus	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6[a]
Cocci & rod mixture	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6 ± 1.28	3.6[a]
Mean	3.6[a]	3.6[a]	3.6[a]	3.6[a]	

Microbiological qualities of manufacturing Laban Rayeb: The microbiological characteristics of manufacturing Laban Rayeb samples

are estimated as logarithms (log cfu/ml). Total bacterial counts Fig 1 exhibit the changes in total bacterial counts of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days. From these data, it could be observed that the total bacterial count of control samples recorded 5.12 of fresh samples, and with increasing the storage periods, the total bacterial count was increased which reached to 8.87 after 15 days of storage at 5 ± 2ºC. On the other hand, the total bacterial counts of Laban Rayeb were 6.21, 6.27 and 6.29 log cfu/ml for that made using Streptococcus, Lactobacillus and the mixture of both, respectively. With increasing the storage periods the total bacterial counts were increased, which reached to 9.13, 9.20 and 8.64 log cfu/ml for Laban Rayeb made using culture of Streptococcus, Lactobacillus and the mixture of both at the end of storage period of 15 days, respectively. The statistical analysis of these data showed that, the total bacterial count of Laban Rayeb produced using Lactobacillus culture and that by used mixture of Lactobacillus and Streptococcus cultures, was increased significantly (P 0.05) with increasing the storage periods. The results are in harmony with those of Abd El-Moneim *et al.* (2004).

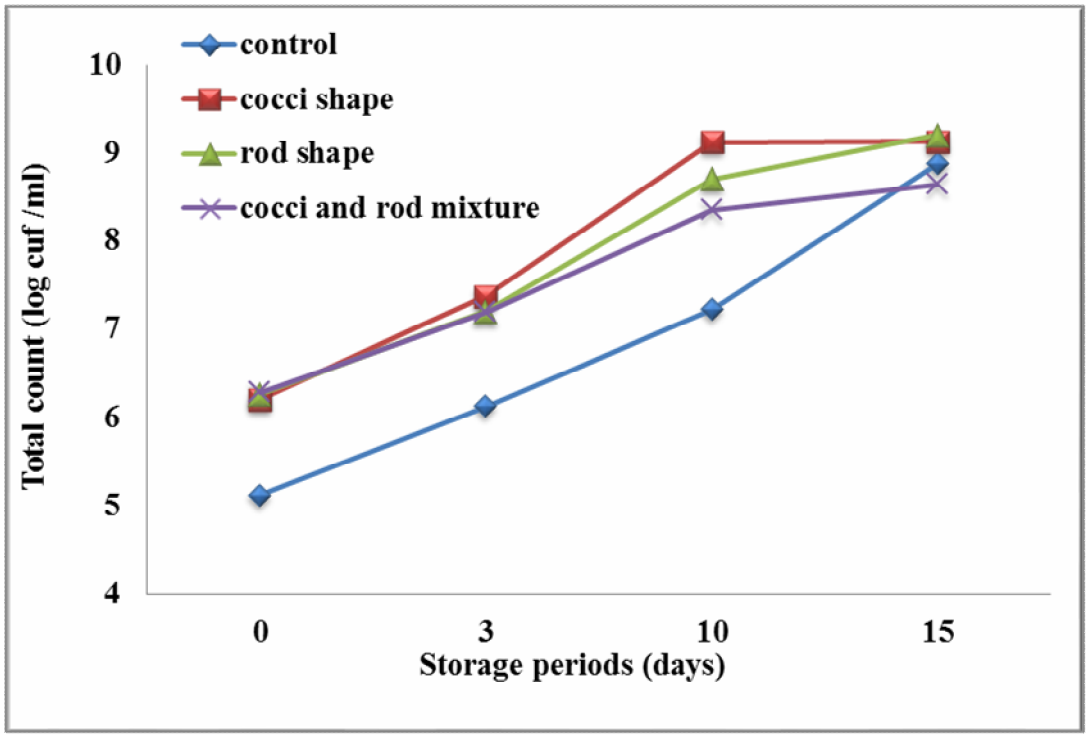

Fig. 1: Total bacterial count of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Proteolytic bacteria counts: From the data presented in Fig 2, it could be revealed that the proteolytic bacteria count of control samples gave the lowest counts of 1.61 (log cfu/ml) in fresh samples, and with increasing the storage periods, the proteolytic bacteria counts increased, which reached to 5.34 (log cfu/ml) at the end of storage periods. While the proteolytic bacteria count of Laban Rayeb produced by isolated cultures

were; 3.54, 3.18 and 3.32 (log cfu/ml) for that obtained by Streptococcus, Lactobacillus and the mixture of both cultures, respectively. With increasing the storage periods, it was noticed that the proteolytic bacteria counts were increased and reached to 6.45, 6.56 and 6.75 (log cfu/ml) for Laban Rayeb made by using Streptococcus, Lactobacillus and the mixture of both culture at the end of storage periods of 15 days, respectively. Statistically this increasing was non-significant (P 0.05). The forgoing results are in agreement with that obtained by Abd El-Salam *et al.* (1990) and Abd El-Moneim *et al*. (2004).

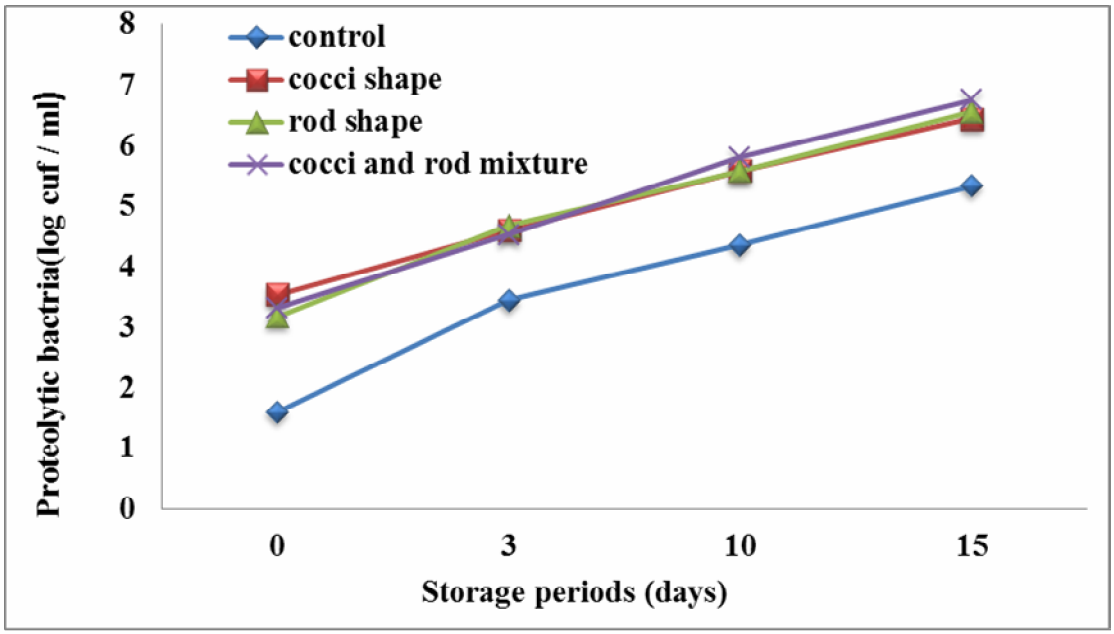

Fig. 2: Proteolytic bacteria count of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Lactobacillus counts: Changes of the Lactobacillus counts are showed in Fig 3. The results revealed that, the control samples had the lowest count at fresh with 5.21 (log cfu/ml), while the highest count was found in Laban Rayeb produced by using the mixture cultures of Streptococcus and Lactobacillus with 7.15 (log cfu/ml). Moreover, with increasing the storage periods, the Lactobacillus spp. counts were increased in all treatments. Which reached after the end of storage periods to 8.13, 9.22 and 9.64 log cfu/ml for Laban Rayeb produced using Streptococcus, Lactobacillus and mixture of both culture, respectively. Statistical analysis revealed that there is no significant different between the Lactobacillus counts of Laban Rayeb from both of Lactobacillus and the mixture of Lactobacillus and Streptococcus culture in fresh samples. While after storage periods a significant differences were found between samples except for fresh and samples stored at 3 days ($p < 0.05$).These results are in agreement with those reported by Abou-Dobara *et al*. (2016).

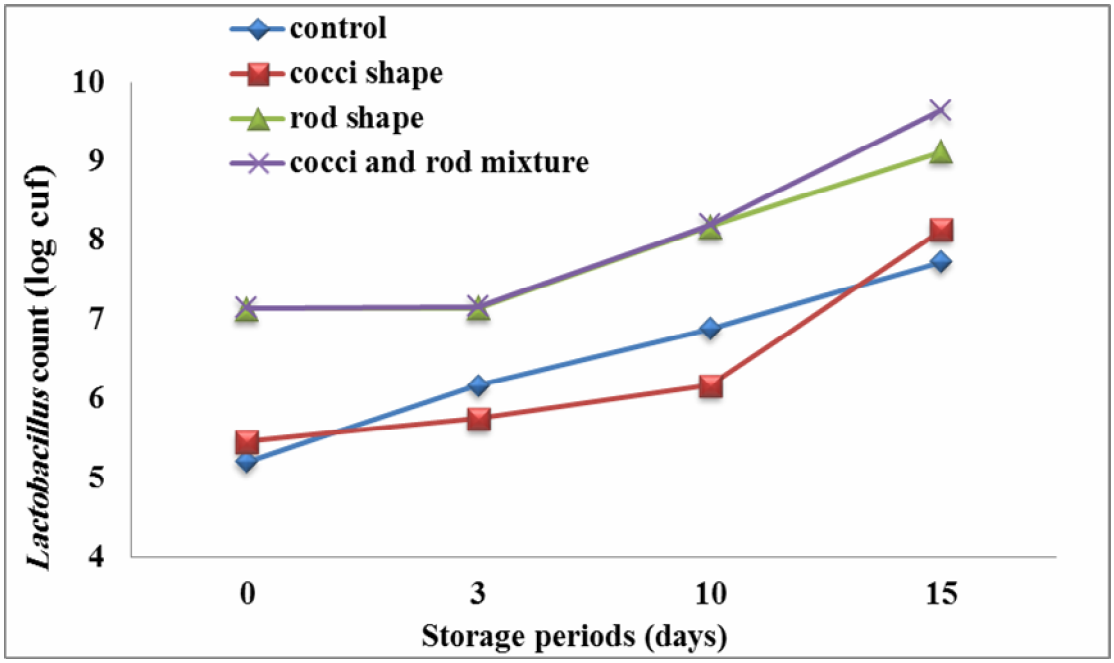

Fig 3: Lactobacillus spp. count of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Streptococcus counts: The results which presented in Fig 4 represents the average of Streptococcus counts (log cfu/ml) of manufactured Laban Rayeb using isolated starter cultures during storage periods at 5 ± 2ºC up to 15 days. The results showed that fresh samples had the lowest counts at control samples (4.86 log cfu/ml), while the highest count was recorded in the case of using Streptococcus starter (6.93 log cfu/ml). With increasing the storage periods, it was noticed that, the Streptococcus counts were increase. After storage periods, it reached to 9.89, 8.17 and 8.76 for Laban Rayeb manufactured using Streptococcus, Lactobacillus and the mixture of both after 15 days of storage, respectively. From statistical analysis of these data it could be observed that there is no significant different between Streptococcus, Lactobacillus and mixture of both. While in case of storage periods a significant differences were found between samples except for samples stored for 3 and 10 days ($p< 0.05$). These results are in agreement with those reported by Abou-Dobara *et al.* (2016).

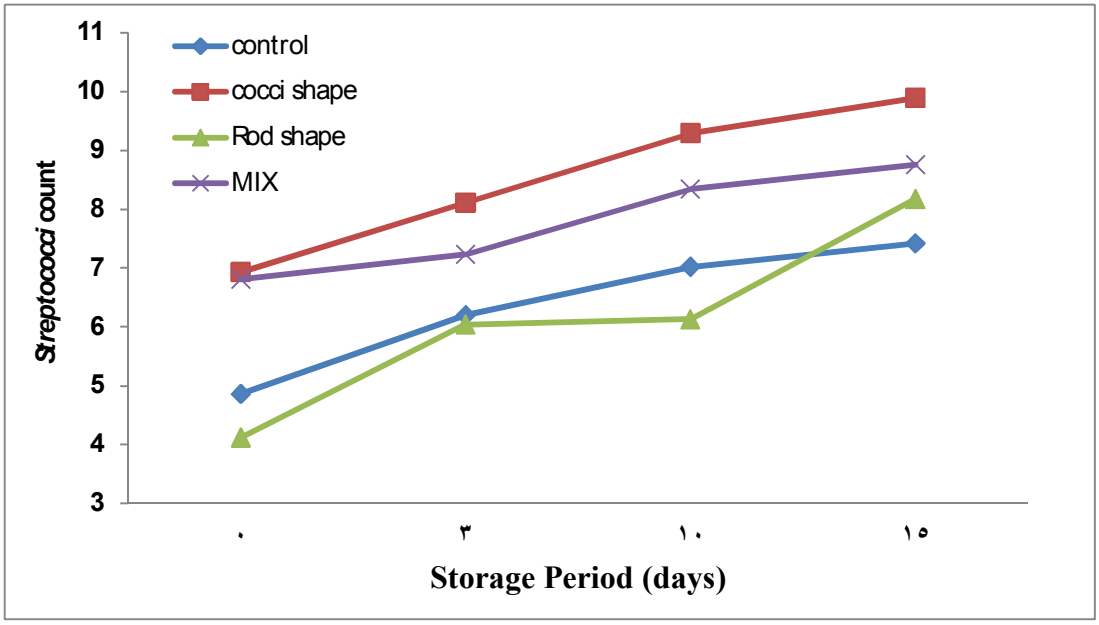

Fig 4: Streptococcus count of manufactured Laban Rayeb using isolated starter cultures during the storage periods at 5 ± 2ºC up to 15 days.

Molds and yeast counts: Regarding to the counts of molds and yeasts, the obtained data from microbiological analysis of the samples showed that, the molds and yeasts had not been detected in all investigated samples. The same finding also was reported by Abou-Dobara *et al.* (2016), they not found molds and yeast growth over the storage periods.

The incidence of coliform bacteria: Concerning to the incidence of coliform bacteria, the obtained data from microbiological analyses of the samples showed that, the coliform bacteria had not been detected in all investigated samples. The same finding also was reported by Abou-Dobara *et al.* (2016).

References

Abbas, A.A.; A.A Amer,. and S.I.S Mohamed,. (2016): Physical, Chemical and Microbiological Properties of Laban Rayeb. Alexandria Journal of Veterinary Sciences, 51(2): 269-274.

Abd Alla, A.A. and H.A Dardir,. (2009): Hygienic Quality of Traditional Fermented Skimmed Milk (Laban Rayeb) Solid in Egypt. World Journal of Dairy and Food Sciences, 4(2): 205-209.

Abd Alla, A.M.K. (2004): Chemical and microbiological studies on some homemade dairy products. M.Sc. Thesis, Fac. Agric., Assiut University.

Abd El-Gawad, I.A.; Abd El-Fatah, A.M. and Al-Rubayyi, K.A. (2010): Identification and characterization of dominant lactic acid bacteria isolated from traditional Rayeb milk in Egypt. Journal of American Science, 6 (10): 728-735.

Abd El-Hamid, A.M.; Khattab, A.A.; El-Ghannam, M.S. and Ziena, H.M. (2008): Chemical and microbiological composition of Laban Rayeb. Egyptian Journal Dairy Science, 36: 221-226.

Abd El-Malek, Y. and M Demerdash,. (1970): Studies on the microbiology of some fermented milks in Egypt. Food and Dairy Microbial. 2nd Conf. Microbial., Cairo, Egypt.

Abd El-Moneim k.H. A. (2004): Chemical and Microbiological Studies on Some Home Made Dairy Products.

M.Sc. Thesis, Faculty of Agriculture, Assiut University....

Abd El-Moneim, R.B. (1978): Studies on the nutritional and hygenic condition of fermented milks. M.Sc. Thesis, High Institute of Public Health, Alexandria University.

Abd El-Salam, M.H.; Mahfouz, M.B.; Al-Khamy, c.a..; Abd El-Ghanie, S. and Sharaf, O.M. (1990): Microbiological quality of salted whey. Egyptian Journal Dairy Science, 18(2): 327.

Abou-Dobara, M.I.; Ismail, M.M. and Nawal, M.R. (2016): A Survey study on chemical and microbiological and sensory properties of industrial Rayeb milk produced in Egypt. Journal Food and Dairy Science, Mansoura University, 7 (2): 119-124.

Abou-Donia, S.A. (2008): Origin history and manufacturing process of Egyptian dairy products: An overview Alexandria Journal Food Science Technol., 5: 51-62.

Abou-Donia, S.A.; Attia, I.A.; Khattab, A.A and El-Khadragy, S.M. (1992b): Characteristics of Labneh manufactured using different lactic acid starter cultures. Egyptian Journal Food Science, 20(1): 1-12.

Abou-Donia, S.A.; Khattab, A.A.; Attia, I.A. and El-Khadafy, S.M. (1992a): Effect of modified manufacturing process of Labneh on its chemical and microbiological quality. Egyptian Journal Food Science, 20(1): 13-23.

Ali, A.A. (1987): Studies on fermented dairy foods. M.Sc. Thesis, Faculty of Agriculture, Ain shams University.

Amer, I.H.; Shelaih, M.A and El-Sayed, M.S. (1985): Incidence of Enterobacteriaceae in Laban Rayeb, Zagazig Vet. Journal, 12(2): 438-445.

AOAC (2000): Association of Official Analytical Chemists. Official Methods of Analysis. 17th Ed, Washington, DC, USA.

Badis A.; Guetarni D.; Moussa-Boudjemaa, B.; Henni, D.E. and Kihal, M. (2004): Identification and technological properties of lactic acid bacteria isolated from raw goat milk of four Algerian races. Food Microbiological, 21: 579-588.

Belitz, H.D.; Grosch, W. and Schieberle, P. (2009): Food chemistry, 4th revised and extended Edn Springer, Berlin/Heidelberg, pp.: 498-545.

Benkerroum, M.N. and Tamine, A.Y. (2004): Technology transfer of Moroccan traditional dairy products (Lben, jben and smen) to small industrial scale. Food Microbiological, 21: 399-413.

Beyene, F. and Abrahamsen, R.K. (1997): Farm-made fermented milk and cottage cheese in Southern Ethiopia. Tropical Science, 37(2): 75 {C.F.: Dairy Science Abstract, 59: 5521, 1997}.

Bhavbhuti, M. and Mehta (2015): Chemical Composition of Milk and Milk Products. Dairy Chemistry Department, M.Sc. College of Dairy Science and Agricultural University.

Dawood, O.K. (1975): Studies on fermented milks in Upper Egypt. M.Sc. Thesis, Fac. Vet. Med., Assiut University.

Difco manual (1998): Difco Manual. 11th Ed., Difco Laboratories. Division of Becton Dickinson and Company, Sparks, Maryland, USA.

El-Bassery, M.M.A. (2001): Microbiological quality of market fermented milks in Assiut city. M.Sc. Thesis, Fac. Vet. Med., Assiut University.

El-Batawy, M.A; Ibrahim, S.A and Hefnawy, S.A. (1987): Use of Cows butter milk in making yoghurt like. Fermented milk product. Egyptian Journal Dairy Science, 15: 239-246.

El-Gendy, S.M. (1983): Fermented foods of Egypt and the Middle East. Journal Food Prot., 46: 358-367.

El-Senaity, M.H. (1999): The composition and quality of cultured buffalo butter milk fermented with mesophilic bacteria. Egyptian Journal of Dairy Science, 27: 269.

Eman, A. Abd El-Hamid; Mohran, M.A. and Nour El-Hoda, H.M. (2015): Chemical Composition of Rural Dairy By-Products. Assiut Journal Agriculture Science, 46(2): 40-49.

Eman, K.A. and Abd El-Sater, M.A. (2003): Mycological quality of Laban Rayeb sold in Assiut city. Assiut Vet. Med., 49(9): 70-80.

FAO (1990): The technology of traditional milk products in developing countries. Food and agriculture organization of the United Nations Rome, 1990.

FIL/IDF Standard (1971a): Fermented Milks: Count of microbial contaminants (reference method). International Dairy Federation, 41square Vergote, 1040 Brussels, Belgium.

FIL/IDF Standard (1971b): Fermented Milks: Count of coliforms (reference method). International Dairy Federation, 41 squares Vergote, 1040 Brussels, Belgium.

FIL/IDF Standard (1971c): Fermented Milks: Count of yeast & moulds (reference method). International Dairy Federation, 41square Vergote, 1040 Brussels, Belgium.

FIL/IDF Standard (1987): Milk, Cream, Fermented Milks, and Evaporated Milk–Total Solids. International Dairy Federation, 41square Vergote, 1040 Brussels, Belgium.

FIL/IDF Standard (1997): Yoghurt. Enumeration of characteristic microorganisms. Colony count technique at 37ºC. International Dairy Federation Standard 117B.

Gomah, N.H. (1999): proteolytic activity of thermoduric Bacteria isolated from milk. M.Sc. Thesis. Faculty of Agriculture Assiut University.

Guessas, B. and Kihal, M. (2004): Characterization of lactic acid bacteria isolated from Algerian arid zone raw goats milk. Afr. Journal Biotechnology, 3: 339-342.

Guizani, N.; Kasapis, S. and Mohammed, Al-Ruzeiki (2001): Microbial, chemical and rheological properties of Laban (cultured milk). International Journal of Food Science & Technology, 36 (2): 199.

Hamad, H.E.; Sulieman, A.E. and Salih, Z.A. (2013): Quality aspects of the Sudanese fermented milk (Robe) supplemented with gum Arabic powder. Discourse Journal of Agriculture and Food Sciences, 1(1): 8-7.

Harrigan, F.W. and McCance, E.M (1976): Laboratory Methods in Food and Dairy Microbiology. 1st Edn., Academic Press Inc., London, ISBN: 0-12-326040-X.

Ibtisam, E.M. El Zubeir.; Wigdan, M.A. and El-Owni, O.A.O. (2004): Chemical composition of fermented milk (roub and mish) in Sudan. Food Control, 16: 633-637.

Khalafalla, S.M.; Fayed, E.O.; Ali, A.A. and El-Samragy, Y.A. (1988): Composition and microbiological properties of Laban Rayeb produced in Lower Egypt. Ecology of Food Nutrition, 21: 297 {C.F.: Dairy Science Abstract, 52: 6800, 1990}.

Khodear, M.M. (2012): Studies on some fermented dairy products. M.Sc. Thesis. Faculty of Agriculture, Assiut University.

Leboff, M.J. and Pierce, B.E. (2011): Exercises for the microbiology laboratory, 4th Ed. Morton Publishing Company, Englewood, CO, USA.

Ling, E.R. (1963): A text book of dairy chemistry, 3rd Ed. Chapman and Hall, Ltd., London.

Madeha, A.A. (1992): The incidence of pathogenic serotypes of Escherichia coli in fermented dairy

products. Ph.D. Thesis, Fac. Vet. Med., Zagazig University.

Magdoub, M.N.; El-Sayed, N.H. and Effat, B.A. (1993): Microbiological quality of Zabadi with special reference to the lactic acid bacteria. Egyptian Journal Food Science, 21(1): 49.

Marshall, R.T. (2004): American Public Health Association. Standard methods for the examination of dairy products, 17th Ed Washington, DC., USA.

Mathara, J.M.; Schillinger, U.; Kutima, P.M.; Mbugua S.K. and Holzapfel W.H. (2004): Isolation, identification and characterization of the dominant microorganisms of Kule naoto: The Maasai traditional fermented milk in Kenya. Int. Journal Food Microbiol., 94: 267-278.

Mohamed, H.A. (2010): Evaluation of some local and imported cheese and fermented dairy products. M.Sc. Thesis, Fac. Agriculture. Assiut University, Egypt.

Mohran, M.A. and Said, M.R. (1988): Chemical and Microbiological Evaluation of fluid fermented Milk in Algeria (EL BEN). Assiut Journal of Agriculture science, 19(3): 160.

Olasupo, N.A. and Azeez, M.K. (1992): Nono: a Nigerian study. Dairy Industries International, 57(4): 37 {C.F.: Dairy Science Abstract, 54: 3966, 1992}.

Salama, E. and Enan, G. (2005): Assessment of microbial status of some dairy products. SCVMJ, VIII (2): 149-158.

Samet-Bali, O. and Attia, H. (2012): Characterization of typical Tunisian fermented milk, Rayeb. African Journal of Biotechnology, 11: 25.

Samet-Bali, O.; Bellila, A.; Ayadi, M.A.; Marzouk, B. and Attia, H. (2010): A comparison of the physico-chemical, microbiological and aromatic composition of Traditional and Industrial Laban in Tunisia. Int. Journal Dairy Technol., 63(1): 98-104.

Samet-Bali, O.; Felfoul, I.; Lajnaf, R.; Attia, H. and Ayadi, M.A. (2016): Hygienic quality of "Rayeb", a traditional Tunisian fermented cow's milk. International Food Research Journal, 23(1): 366-369.

SAS (1999): Statistical analysis system, User's guide for personal computers, Version 8.2 Edition SAS Institute, Cary, N.C.

Sayed, M. (2012): Laban rayeb and yoghurt: sensory, rheological, chemical and microbiological properties. Assiut Vet. Med. Journal, 58: 132.

Steel, R.G.D. and Torrie, J.H. (1980): Principles and Procedures of Statistics. New York, NY. McGraw-Hill Book Co., Inc.

Varnam, A.H. and Sutheland, J.P. (1994): Milk and Milk Products: Technology, Chemistry and Microbiology. Chapman and Hall, London, U.K.

Vasilyevich, T. and Shah, N.P. (2008): Probiotics from Metchnikoff to bio actives. International Dairy Journal, 18: 714-728.

Youssef, Y.B.; El-Senaity, M.H. and Abd Rabou, N.S. (1998): Manufactured of cultured butter milk based on cow's milk and mesophilic starters. Journal of Agriculture Science, Mansoura University, 23: 2119-2126.

Zedan, M.A.; Salama, F.M.M.; Anis, S.M.K. and Seiha, A.M. (2003): The effect of stabilizers and sodium citrate on the properties of Rayeb milk manufactured by combined culture of Lactobacillus helveticus. Mesophilic freeze shocked. Egyptian Journal Dairy Science, 31: 259-271.

Assiut J. Agric. Sci., (50) No. (2) 2019 (38-52) *ISSN: 1110-0486*
Website: www.aun.edu.eg/faculty_agriculture/journals_issues_form.php *E-mail: ajas@aun.edu.eg*

تقييم الجوده الكيميائيه والميكروبيه للبن الرايب المصنع

حنان علي احمد، يوسف حسانين شاهين، محمد عطية مهران وعادل علي تمام

قسم الألبان ، كلية الزراعة ، جامعة أسيوط

الملخص

تقييم اللبن الرايب المصنع تحت الظروف المعمليه المعقمه مستخدما مجموعات بكتريا حامض الاكتيك المعزوله من اللبن الرايب المجمع من المعامل الصغيره بمدينه اسيوط. تم عزل مستعمرات Lactobacillus sp باستخدام بيئه MRS و Streptococcus sp. باستخدام بيئه M17 في مزارع نقيه. تم تلقيح اللبن البقرى المعامله حراريا على ٧٣ درجة مئوية وتم التبريد إلى ٣٧ درجة مئوية بواسطة مزرعه واحدة معزولة من اى منهما و خليط منها ١: ١ بالوزن ، لإنتاج لبن رايب في ظروف معملية معقمة. تم تخزين اللبن المختبر لمدة ١٥ يوماً على ٥ ± ٢ درجة مئوية. وجد ان متوسط الحموضة والمواد الصلبة الكلية والنيتروجين الكلى والنيتروجين الذائب وجد انه ٠,٧ و ١١,٣٦ و ٠,٤٤ و ٠,١١٢ في اليوم الأول. من التخزين وزاد إلى ٠,٧٦ ، ١١,٥٢ ، ٠,٤٩ و ٠,١٦٩٪ بعد ١٥ يومًا من التخزين على التوالي بالنسبه الى عينه الكنترول. وجد ان متوسط الحموضة والمواد الصلبة الكلية والنيتروجين الكلى والنيتروجين الذائب في عينات لبن رايب الذي تنتج من استخدام Streptococci sp يعادل ٠,٧٤ ، ١١,٣٣ ، ٠,٤٤ و ٠,١١٤٪ في اليوم الأول من التخزين وحيث ارتفعت إلى ٠,٩٥ و ١٢,٢٢ و ٠,٦١ و ٠,١٦٠٪ بعد ١٥ يومًا. وجد أن متوسط الحموضة والمواد الصلبة الكلية والنيتروجين الكلى والنيتروجين الذائب للبن رايب الناتج من التلقيح بواسطة Lactobacillus sp يساوى ٠,٧٦ و ١١,١٦ و ٠,٤٥ و ٠,١٠٣٪ في اليوم الأول من التخزين، وارتفعت إلى ٠,٩٦ و ١١,٧٥ و ٠,٥٩ و ١٤٦٪ بعد ١٥يوم من التخزين. بينما اللبن الريب الناتج عن خلط بنسبه ١:١بكتريا Lactobacillus sp و Streptococci sp أعطت متوسط الحموضة والمواد الصلبة الكلية والنيتروجين الكلى والنيتروجين الذائب من ٠,٨٤ ، ١١,٣٦ ، ٠,٤٢ و ٠,١٢٣٪ ارتفع خلال فترة التخزين قيم الحموضة والصلبة الكلية والنيتروجين والنيتروجين القابل للذوبان ارتفع ليصل إلى ١,٢ ، ١١,٩ ، ٠,٥٥ و ٠,١٩٢٪ بعد ١٥ يومًا من التخزين على التوالى.

متوسط لوغاريتمات مجموع قيم العدد البكتري في اللبن الرايب المنتج من كنترول Streptococci sp و Lactobacilli sp و (Lactobacillus sp و Streptococci sp) على التوالي وجد انه ٥,١٢ و ٦,٢١ و ٦,٢٧ و ٦,٢٩ log(cfu / ml) في اليوم الأول من التخزين وزادت إلى ٨,٨٧ ، ٩,١٣ ، ٩,٢٠ ، ٨,٦٤ log(cfu / ml) بعد ١٥ يومًا من التخزين. في حين أن اللوغاريتم بكتيريا حمض اللاكتيك Lactobacilli sp. قيم العد في كنترول Streptococci sp و Lactobacilli sp و (Lactobacillus sp و Streptococci sp)على التوالي تراوحت من ٥,٢٢ ، ٥,٤٦ ، ٧,١٤ ، ٧,١٥ log(cfu / ml) في اليوم الأول للتخزين وزادت إلى ٧,٧٣ ، ٨,١٣ ، ٩,٢٢ ، ٩,٤٦ log (cfu / ml) بعد ١٥ يومًا من التخزين ، متوسط لوغاريتم بكتريا حمض اللاكتيك في كنترول Streptococci sp و Lactobacilli sp و (Lactobacillus sp و Streptococci sp)على التوالي وجد انه ٤,٨٦ و ٦,٩٣ و ٤,١٢ و ٧,١٥ log(cfu / ml) في اليوم الأول من التخزين وزادت إلى ٧,٤٢ ، ٩,٩٨ ، ٨,١٧ ، ٨,٧٦ log (cfu / ml) بعد ١٥ يومًا من التخزين ، متوسط لوغاريتم بكتريا حامض اللاكتيك من البكتريا المحللة للبروتين قيم العد في Laban Rayeb التي تنتجها فى الكنترول Streptococci, Lactobacilli sp و (Lactobacillus sp و Streptococci sp) على التوالي تراوحت من ١,٦١ ، ٣,٥٤ ، ٣,١٨ ، ٣,٣٢ log(cfu / ml) في اليوم الأول من التخزين وزيادة إلى ٥,٣٤ ، ٦,٤٥ ، ٦,٥٦ ، ٦,٧٥ log(cfu / ml) بعد ١٥ يومًا من التخزين. في حين أن النتائج اظهرت خلو اللبن الرايب المصنع من الخمائر والفطريات وكذا بكتريا القولون .