

Chemical Composition and Microbiological Quality of Laban Rayeb in Assuit City.

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ABSTRACT

A total of 36 samples of Laban Rayeb were collected from 12 different small dairy plants in Assuit Governorate. samples were analyzed for their chemical composition and microbiological quality. The Results showed that the average values of acidity %, moisture, total solids, fat, total nitrogen, soluble nitrogen, soluble nitrogen coefficient were 1.1, 88.29, 11.66, 2.41, 0.52, 0.17 and 4.87, respectively. Moreover, microbiological analysis revealed that the log¹⁰ of total bacteria count ranged from 7.03 to 7.21cfu, counts of lactic acid bacteria counts ranged from 5.781 to 6.353cfu, and the coccus group ranged from 5.83 to 6.29cfu and proteolytic bacteria ranged from 4.36 and 6.89cfu. Finally, yeasts and moulds count ranged from 0.00 to 5.21cfu in fresh Rayeb milk samples. Coliform bacteria couldn't be detected in all of the examined samples.

Keywords: Laban Rayeb, Chemical composition, Microbiological quality.

INTRODUCTION

Fermented milk products are the most popular fermented dairy products known in Egypt and worldwide. It is believed that fermented milk products may have originated in Middle East as early as 1300 before century (BC) as means of preserving milk. Nowadays, Laban Rayeb is the popularly made of surplus milk for preservation (Salih *et al.* 2011). Furthermore, there are an increase in the production of fermented milk products in developed countries. Traditional fermented milk products are widely consumed in the entire world. These products are of an important supplement to the local diet, and provide vital elements for growth, good health and an acceptable flavor (Al-Otaibi, 2009; Uccello *et al.*, 2012). Laban Rayeb is usually consumed by different ages in Egypt and other countries, for its nutritive value and therapeutic properties. Laban Rayeb is a traditional curdled dairy product that has been known and highly demanded by consumers since old time in Egypt and some Arab countries. It is mad by spontaneous fermentation of milk. It can be consumed as a fresh beverage or with some other foods such as bread. Some studies were carried out by Benkerroum and Tamime (2004) and Samet-Bali and Attia (2010), who stated that Rayeb could be considered as a product with important nutritional value.

Laban Rayeb is a product highly consumed in Egypt and Aria countries. The risk of it's contaminated with pathogenic microflora is very high. the dominant bacteria in fermented milk products are lactic acid streptococci and lactobacilli, which effectively suppress the spoilage and pathogenic organisms (Kosikowski, 1982). Fermentation was usually applied used to control the growth of harmful bacteria, and some pathogens while making indigenous milk products.

Various possible probiotic and therapeutic roles of starter microorganisms in cultured milks as anticarcinogenic activity, reduction of serum cholesterol levels, improvement of effects of renal malfunction, maintenance of normal intestinal microflora, improvement of lactose maldigestion and nutritional enhancement (Varnam and Sutherland, 1994). Laban Rayeb is usually made by the Egyptian farmers from fresh milk, by placing at an earthenware pot "Matared" and left undisturbed in a warm place until the cream rises, and the lower partially skimmed milk coagulates; after removing the cream layer, which mainly made into butter, the remaining curd "Laban

Rayeb" is either consumed as fermented milk or converted to Kharish cheese (El-Gendy, 1983).

Therefore, the objective of this study was to evaluate the chemical and microbiological quality of Laban Rayeb obtained from Assuit city.

MATERIALS AND METHODS

Laban Rayeb samples: 36 samples of Laban Rayeb were collected from different 12 small plants in Assiut city, All the samples were immediately kept under aseptic conditions and cooled until analyzed.

Chemical Analysis:

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

Microbial Analysis:

10 ml of well stirred Laban Rayeb was transferred Under aseptic condition, to 90 ml sterilized saline (0.85 % NaCl) in making the serial dilution were prepared for counting the following groups of bacteria by Marshall (2004)

Total Bacterial Count (T.B.C.):

Determined by using the standard plate count technique as described by (Marshall, 2004).

Lactic Acid Bacteria count: counted by using MRS agar medium according to the methods described in the International Standard FIL/IDF 117A (1988).

Coliform bacteria detection: using Maconkey broth according to Bradley *et al.* (1992).

Yeasts & Moulds Counts according to the methods described in IDF (1985). proteolytic bacteria count: 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).

RESULTS AND DISCUSSION

Data in Table (1) represent the chemical composition of the Laban Rayeb samples being collected from different places of Assiut city. From this Table, it could be observed that the acidity values ranged from 0.76 – 1.33, with a mean value of 1.01 %. It could also be observed that the samples with the highest acidity were 1.19 and 1.28 % for sample(1) and sample (5) however, the

lowest acidity were 0.77 and 0.81 for sample(3) and sample(10). These results are in harmony with those of Khalafalla et al. (1988)

As shown in Table (1) the moisture content of Laban Rayeb samples ranged from 86.7 % in sample (6) to 90.47% in sample(11), with a mean value of 88.29 %. It was also noticed that the differences between the moisture content % of all tested samples were significant, except that between samples collected (2,5,8) and (9). The above results are in agreement with those reported by Mohran and Said (1988).

Total nitrogen (TN) and soluble nitrogen (SN) contents of Laban Rayeb were shown in Table (1) Total nitrogen ranged from 0.457 in sample (2) to 0.61% in sample (9), with an average of 0.52 %, The content of S.N was found to be ranged between 0.110 for sample (2) and 0.207% for sample(9), with an average of 0.170 %. It could also be observed that the samples with the highest total nitrogen were 0.56 in sample(11) and 0.57 in sample(12), while the lowest were 0.46 in sample(5) and 0.47 in sample(7). The differences between the total nitrogen values were significant at (P <0.0001), except those between the samples (3, 5 and 7), (6 and 8) and (10 and 11). On the other hand, the Laban Rayeb samples collected from sample 7(0.196) and sample(1) (0.187) gave the highest soluble nitrogen contents and the lowest soluble

nitrogen contents were 0.129 and 0.142 for sample(8) and sample(12). The difference between the soluble nitrogen values were significant at (P <0.0001). However, all values of the investigated samples lie round the low value of the ranges obtained by Khalafalla et al. (1988).

Soluble nitrogen coefficient of Laban Rayeb were shown in Table (1) the values of the Laban Rayeb samples collected from sample 7(6.47) gave the highest soluble nitrogen coefficient percentages and the lowest soluble nitrogen coefficient percentages were 3.07 sample2. The difference between the soluble nitrogen coefficient values were significant at (P <0.0001).

Results in Table (1) which represents the fat percentages of the Laban Rayeb samples revealed that the fat contents of the samples were ranged from 0.33% obtained from (sample 9) to 4.10 % obtained from (sample5) with an average of 2.41%. It could be observed also that the samples with the highest fat percentages were 3.46 for sample 2 and 4.00 for sample6, while the lowest fat percentages were 0.53 and 0.86 for sample(11) and sample(4) respectively. The statistical analysis showed significant differences between samples except for (2 and 10), (5 and 6) and (7, 8 and 12). Results of these samples are consistent with the results of Abd-EL-hamid et al. (2008)

Table 1. The chemical composition of Laban Rayeb collected from Assiut city.

Samples number	Acidity	Moisture %	T.S %	T.N %	S.N %	SN/TN X 100	Fat %
1	1.28±0.06 ^{ab}	87.79±0.15 ^{de}	12.21±0.15 ^{bc}	0.55±0.056 ^{bc}	0.187±0.007 ^{bc}	5.28 ^{bc}	1.5±0.0 ^e
2	1.10±0.26 ^{bcd}	88.45±0.005 ^{cd}	11.55±0.005 ^{cd}	0.45±0.01 ^e	0.110±0.005 ^h	3.07 ^h	3.46±0.05 ^b
3	0.77±0.05 ^f	87.93±0.83 ^{cde}	12.04±0.82 ^{bcd}	0.49±0.01 ^{de}	0.183±0.01 ^{cd}	5.81 ^{cd}	1.73±0.25 ^d
4	0.93±0.15 ^{def}	88.03±0.02 ^{cde}	11.93±0.05 ^{bcd}	0.55±0.01 ^{bc}	0.171±0.007 ^{de}	4.87 ^{de}	0.86±0.05 ^f
5	1.19±0.05 ^{abc}	88.20±0.10 ^{cd}	11.77±0.15 ^{cd}	0.46±0.016 ^{de}	0.167±0.01 ^e	5.62 ^e	4.10±0.10 ^a
6	0.83±0.15 ^{ef}	86.7±0.02 ^f	13.3±0.05 ^a	0.51±0.016 ^{cd}	0.175±0.007 ^{cde}	5.35 ^{cde}	4.0±0.05 ^a
7	0.90±7.300 ^{def}	88.60±0.30 ^e	11.40±0.30 ^d	0.47±0.02 ^{de}	0.196±0.00 ^{ab}	6.47 ^{ab}	3.0±0.0 ^c
8	0.76±0.01 ^f	88.20±0.10 ^{cd}	11.77±0.15 ^{cd}	0.51±0.01 ^{cd}	0.129±0.00 ^g	3.94 ^g	3.0±0.0 ^c
9	1.14±0.06 ^{abc}	88.26±0.09 ^{cd}	11.40±0.12 ^d	0.61±0.01 ^a	0.207±0.00 ^a	5.35 ^a	0.33±0.0 ^h
10	0.81±0.04 ^f	89.51±0.62 ^b	10.46±0.63 ^e	0.55±0.02 ^{bc}	0.148±0.00 ^f	4.18 ^f	3.46±0.05 ^b
11	1.02±0.06 ^{cde}	90.47±0.80 ^a	9.53±0.80 ^f	0.56±0.02 ^{bc}	0.182±0.01 ^{cd}	5.10 ^{cd}	0.53±0.05 ^g
12	1.33±0.15 ^a	87.41±0.07 ^e	12.59±0.07 ^b	0.57±0.00 ^{ab}	0.142±0.0 ^f	3.85 ^f	3.0±0.0 ^c
The general mean	1.01	88.29	11.66	0.52	0.17	4.87	2.41

Values with the same letter in each column are not-significant differences at level of 0.0001

Table (2) represents the microbiological characteristics of Laban Rayeb samples collected from Assiut city and the values are estimated as logarithms. From this data it could be observed that the total bacterial counts ranged from 7.03 in samples collected

from sample (3) and sample(12) to 7.2 in sample(6), and The differences between all total bacteria counts were nonsignificant. These results are in agreement with those reported by Mohran and Said (1988)

Table 2. The microbiological characteristics of Laban Rayeb samples.

Samples number	Total Counts	Lactobacilli MRS	Streptococci M17	Moulds & yeast	Proteolytic bacteria	Coliform Bacteria
1	7.13488 ^a	6.09532 ^b	6.11965 ^{abc}	5.2108 ^a	5.3561 ^{cd}	ND [*]
2	7.07584 ^a	6.15549 ^b	6.02255 ^{bcd}	3.8259 ^c	4.3626 ^e	ND
3	7.03464 ^a	6.08784 ^{bc}	6.08771 ^{abc}	3.0792 ^d	6.8920 ^a	ND
4	7.15595 ^a	6.35371 ^a	6.17682 ^{ab}	3.7092 ^c	6.3977 ^b	ND
5	7.19394 ^a	6.16432 ^b	6.28648 ^a	3.8101 ^c	5.7870 ^c	ND
6	7.20774 ^a	5.91966 ^{cd}	6.15069 ^{abc}	5.1943 ^a	5.5666 ^{cd}	ND
7	7.12554 ^a	6.12775 ^b	5.94189 ^{cd}	3.8919 ^c	5.7116 ^c	ND
8	7.12412 ^a	6.06780 ^{bc}	6.05801 ^{bc}	5.0403 ^a	5.4980 ^{cd}	ND
9	7.16035 ^a	6.14032 ^b	6.01277 ^{bcd}	5.0161 ^a	5.5340 ^{cd}	ND
10	7.17586 ^a	6.23597 ^{ab}	6.05840 ^{bc}	4.4393 ^b	5.7013 ^c	ND
11	7.14488 ^a	6.12613 ^b	6.09516 ^{abc}	4.5785 ^b	5.6982 ^c	ND
12	7.03461 ^a	5.78105 ^d	5.83437 ^d	ND	5.2177 ^d	ND

*ND: not detected

Yeasts and moulds counts showed that all samples contain yeasts and moulds ,except the samples collected from sample12. It could be observed that the proteolytic bacteria count detected in all samples which ranged from 4.36 (sample2) to 6.89 (sample3). Finally, the coliform bacteria were not detected in all investigated samples.

CONCLUSION

It could be concluded that the different samples of traditional Laban Rayeb produced in Assiut governorate were safe for consumption; however more attention must be paid to improve the quality of raw milk and the equipment used in its manufacturing. Samples contains the recommended level of total solids, fats and total protein. Also, the coliform bacteria have not detected in the investigated samples, make it a suitable for human diet.

REFERENCES

- Abd-El Hamid, A. M.; Khatib , A. A.; El-Ghannam , M. S. and Ziena, H. M. (2008). Chemical and microbiological composition of Laban Rayeb. Egyptian J. Dairy Sci. 36:221-226.
- Al-Otaibi, M.M. (2009): Evaluation of some probiotic fermented milk products from Al-Ahsa Markets, Saudi Arabia.American Journal of Food Technology 4: 1-8.
- AOAC. (2000). Association of Official Analytical Chemists. Official Methods of Analysis. 17th ed, Washington, DC, USA.
- Benkerroum, M.N and Tamine, A.Y. (2004). Technology transfer of Moroccan traditional dairy products (Lben, jben and smen) to small industrial scale. Food Microbiol. 21: 399-413.
- Bradley, R.L.J.; Arnold, E.; Barbano, D.M.; Semerad, R.G.; Smith, D.E. and Viries, B.K. (1992): Chemical and physical methods. In Marshall R.T. (Eds) Standard Methods for the Examination of Dairy Products, p. 433-533.
- El-Gendy, S.M. (1983): Fermented foods of Egypt and the Middle East. J.Food Prot. 46: 358-367.
- FIL/IDF Standard (117A/1988): Yoghurt: Enumeration of Characteristic Microorganisms- Colony Count Technique at 37°C. International Dairy Federation, 41square Vergote, 1040 Brussels, Belgium.
- FIL/IDF Standard (94A/1985). Milk and milk products. Detection and enumeration of yeasts and moulds. International Dairy Federation, 41square Vergote, 1040 Brussels, Belgium.

- Khalafalla, S.M.; Fayed, E.O.; Aly, A.A. and El-Samragy, Y.A. (1988). Composition and microbiological properties of Laban Rayeb produced in Lower Egypt. Ecol. Food Nutr. 21(4): 297-302.
- Kosikowski, F.V. (1982): Fermented milk. In: Cheese and Fermented milk food. 2nd Edith, chapter 4. Edwards Brothers, Inc., Ann Arbor Michigan, USA p: 38.
- Ling, E. R. (1963):A text book of dairy chemistry, 3ed ed. Chapman and Hall, Ltd., London.
- Marshall, R.T. (2004). American Public Health Association. Standard methods for the examination of dairy products, 17th ed Washington, DC., USA.
- Mohran M.A., and said M.R., (1988). Chemical and Microbiological Evaluation of fluid fermented Milk in Algeria (EL BEN). Assiut journal of agriculture sci 19 (3): 160.
- Salih, A.M.M.; El-Sanousi, S.M. and El-Zubeir, Ibtisam E.M. (2011): A review on the Sudanese traditional dairy products and technology. Int. J. Dairy Sci. 6(4): 227-245.
- Samet-Bali, O.; Bellila, A.; Ayadi, M. ; A.; Marzouk B., and Attia H (2010): Acomparison of the physicochemical, microbiological and aromatic composition of Traditional and Industrial Leben in Tunisia. Int. J. Dairy Technol. 63(1): 98-104.
- SAS. (1999). Statistical analysis system, User's guide for personal computers, Version 8.2 Edition SAS Institute, Cary, N.C.
- Steel, R.G.D. and Torrie, J.H. (1980). Principles and Procedures of Statistics. New York, NY. McGraw-Hill Book Co., Inc
- Tomas, S.B. and the Tomas B. F. (1975): The bacteriological grading of bulk collected milk. 8 : Differential and selective agar media. Dairy Indus., 40 : 397.
- Uccello, M.;Malaguarnera, G.; Basile, F.;D'agata, V.;Malaguarnera, M.;Bertino, G.; Vacante, M.;Drago, F. and Biondi, A. (2012).Potential role of probiotics on colorectal cancer prevention. BMC Surgery 12: 45-49.
- Varnam, A.H. and Sutherland, J.P. (1994): Milk and Milk Products: Technology, Chemistry and Microbiology. Chapman and Hall, London, UK.

التركيب الكيماوي والجودة الميكروبيولوجية لللبن الرايب فى مدينة اسويط حنان على احمد ، يوسف حساتين شاهين ، محمد عطيه مهران و عادل على تمام قسم علوم وتكنولوجيا الالبان - كلية الزراعة - جامعه اسويط

تم دراسة التركيب الكيماوي والمحتوى الميكروبي لـ ٣٦ عينة من اللبن الرايب جمعت من ١٢ مصدر مختلف من معامل تصنيع الالبان الصغرى بمدينة اسويط فكانت المتوسطات العامة لكل من الحموضة والرطوبة والجوامد الصلبة الكلية والدهن والنيتروجين الكلى والنيتروجين الذائب ومعامل النيتروجين الذائب كنسب مئوية على الترتيب التالي: ١.١ - ٨٨.٢٩ - ١١.٦٦ - ٢.٤١ - ٠.٥٢ - ٠.١٧ - ٤.٨٧%. كما اشارت نتائج التحليل الميكروبيولوجي ان اللوغاريتم السالب للعدد الكلى للبكتيريا تراوح ما بين ٧.٠٣٤ الي ٧.٢٠٧. كما دلت نتائج الدراسة احتواء العينات موضع الدراسة علي اعداد تراوحت ما بين (٥.٧٨١ الي ٦.٣٥٣) و (٥.٨٣٤ الي ٦.٢٨٦) من بكتيريا حامض اللاكتيك العصوية وبكتيريا حامض اللاكتيك الكروية علي التوالي. كما احتوت العينات علي اعدادا من الخمائر والفطريات تراوحت ما بين الصفر و ٥.٢١٠. بينما تراوحت اعداد البكتيريا المحللة للبروتين ما بين ٤.٣٦٢ و ٦.٨٩٢. واخيرا اكدت النتائج خلو جميع العينات موضع الدراسة من بكتيريا القولون.