QUALITY EVALUATION OF BUTTER SOLD IN ALEXANDRIA MARKETS

Sawsan, M. L. El-Sheshnagui., Nabila, F. El-Sayed & Wafaa, M. Eissa

Animal Health Research Institute, Alexadria

Department of Food Hygiene Researchs

ABSTRACT

A total of 60 butter samples (20 of each of imported cow butter, locally produced cow butter and locally produced buffalo butter) were collected aseptically from different Alexandria markets. The samples were subjected to microbiological and chemical examination to evaluate its sanitary condition on the basis of Egyptian organization for Standardization and Quality Control, 2005 specifications. The results of the current study revealed that 20%, 40% and 55% of the examined imported butter, locally produced cow butter and locally produced buffalo butter samples exceeded the maximum permissible limit of coliform bacteria with average counts of 9.2±1.3, 32.2±2.6 and 38±5.8 MPN/g respectively. However, 35%, 55% and 75% of such samples were over the permissible limit of total yeast and mold count with average counts of $3.4x10 \pm 1.5x10$, $5.8x10^2 \pm 1.6x10^2$ and $5.2x10^3 \pm 2.3x10^2$ c.f.u/g. Lipolytic and psychrotrophic bacteria were isolated from all of the examined samples with counts exceeding the allowable limit. ($9.1x10 \pm .1.1x10$, $4.1x10^3 \pm 2.6x10$ and $5.9x10^2 \pm 6.1x10$ c.f.u/g for lipolytic and $3.5x10^2 \pm 1.3x10^2$, $6.5x102 \pm 2.9x10^2$ and $5.5x10^3 \pm 8.2x10$ c.f.u/g for psychrotrophic bacteria).Salmonella could not be detected but Shigella was isolated from one sample only representing 5% of locally produced cow butter samples. Staphylococcus aureus was detected in 40%, 55% and 60% while Listeria species In the order of 25%, 15% and 10% of imported butter, locally produced cow butter and locally produced buffalo butter samples respectively. The chemical examination showed that 10%, 50% and 100% of such samples respectively were above the allowable limit for moisture content. Sodium chloride content was above the permissible limit in 25% of locally produced cow butter and 35% of locally produced buffalo butter.

INTRODUCTION

Butter is essentially the fat of milk. It is a water-in-oil emulsion. Commercial butter is composed of 80%-82% milk fat, 16%-17% water and 1%-2% milk solid-not-fat (sometimes referred to as curd). It may contain salt, added directly to the butter in concentrations of 1%-2%. Unsalted butter is often referred to as "sweet butter". This should not be confused with "sweet cream" butter, which may or may not be salted. Reduced-fat or "light" butter usually contains about 40% milk fat. Butter also contain protein, ealcium and phosphorous and fat-soluble vitamins

Coliform baeteria in a sample of butter probably would indicate gross contamination in most instances, but there are circumstances when considerable number of these organisms may occur even in salted butter.

Psychotrophic bacteria are those able to grow at 70C or less regardless of their optimal growth temperature. Psychotrophic bacteria that are commonly isolated from dairy products belong to a variety of genera, but in general, these bacteria are non-pathogenic. Some pathogenic bacteria are psychotrophic (eg. Listeria monocytogenes **(Frank et al., 1992)**. If butter has been contaminated in the manufacturing process and if conditions such as poor water dispersion and high temperature favor microbial growth, spoilage may occur. Psychrotrophic bacteria are predominant in this type of deterioration and when present in butter, they can cause a variety of butter defects. **(Cousin, 1982)**.

Sabreen (1996) recorded a mean count of 26x10/g and 19x10/g for Psychotrophic bacteria in imported and local butter respectively.

An increasing problem is lipolysis in butterfat after manufacturing, which is caused by thermoresistant lipase enzymes that are created in the milk or cream by psychotrophic bacteria or by residual native lipases that survive pasteurization **(Sabreen, 1996)**. Lipolytic and proteolytic bacteria produce enzymes during their growth in milk from which cream used for butter making. These enzymes remain active after heat treatment and can damage the quality of butter **(lawrence, 1967)**. Most of psychrotrophic and thermoduric bacteria, yeasts and molds have the ability of proteolyses and lipolysis **(APHA, 1985)**. The enumeration of lipolytic baeteria in butter may be helpful in drawing attention to unsatisfactory manufacturing and handling procedures. Average count of $7.5x10^5$ c.f.u/g of butter for lipolytic bacteria was recorded by **Patir, et al., 1995**. While in Egypt **El-Demerdash, (1990)** reported counts of $16.7x10^3$ vs and $19.3 x10^3$ for lipolytic bacteria in imported and local butter samples respectively.

High mold and yeast count may be attributed to the faulty methods in processing specially in connection with inadequate sanitation of the churn. Inefficient pasteurization, low salt content, improper conditions of storage or a combination of any of these may be responsible for high counts. The evidence available indicates that there is a tendency for butter with low mold and yeast counts to possess better keeping quality than butter with high counts. Yeasts and molds do not survive pasteurization. When present in butter, they indicate faulty sanitation and air contamination **(Murphy, 1990)**. **Aman, (1985)** recorded an average yeast and mold count of 99x10/g of cooking butter while a mean count of 2.5x10/g of cooking butter was reported by **Ahmed et al., (1987)**. **Mohmad et al., (1983)** detected a mean yeast count of 41.87x10/g and a mean mould count of 55.2x10/g of cooking butter respectively. While **Tasnim et al., (1993), Rajaraman et al., (1994) and Patier et al., (1995)** recorded mean counts of 3.84x10/g and 8.3x10/g and 9x10/g of table butter for yeast and mould respectively.

During the current study, Salmonella species could not be detected while Shigella spe-

cies was isolated from one sample only representing 5% of locally produced cow butter samples. Staphylococcus aureus was detected in 40%, 55% and 60% while Listeria species In the order of 25%, 15% and 10% of imported butter, locally produced cow butter and locally produced buffalo butter samples respectively (table 2).

El-Gazzar & Marth, (1995) found that butter readily supported growth of salmonellae at room temperature, and neither freezing nor refrigeration for brief periods eliminated salmonellae from butter. However, **Santos et al., (1995)** and **Tasnim et al., (1993)** failed to detect Salmonella in butter, while Staphylococcus aureus **(Santos et al., 1995** and **Nazem, 1991)**, Listeria innocua. **(Massa et al., 1990)** were detected.

In the current study, results of the chemical examination showed that 10%, 50% and 100% of imported cow butter, locally produced cow butter and locally produced buffalo butter samples respectively were above the allowable limit for moisture content. Sodium chloride content was above the permissible limit in 25% of locally produced cow butter and 35% of locally produced buffalo butter. The sodium Chloride % of the examined butter samples was presented in Table (3). Lower results of a range of 0.9% to 1.05 % and a mean % of 0.46± 0.04 % were obtained by **Alad (2002)** and **Saleh (1995)**, while higher salt % was recorded by Nazem (1991). The pH values of the examined butter samples were recorded in table (3) reflecting the acidic nature of all of the samples. Nearly similar results were recorded by **Alad (2002)** and lower values by **Nawar (2001)**.

Rancidity can be detected by measuring the acid degree value which determines the presence of free fatty acids. Several studies indicated that a high content of unsaturated fatty acids in milkfat increases the risk of oxidation and production of off-flavors **(Im & Marshall, 1998)**.

Lewis et al., (2006) stated that three percent salt results in 15.8% water phase salt butter that is inhibitory to all food-borne pathogens except Staphylococcus aureus. On the other hand, 1% salt drops the level in the water phase to 5.9%, which would permit the growth of most food-borne pathogens. The need for time/temperature control depends on the pH and of the product, and on whether other preservatives have been added to the formulation.

CONCLUSION

The safety of butter has been the concern of the modern daily industry as it regards food safety as a critical feature of its produet. Therefore, careful control of proeessing and storage conditions should be applied to ensure the safety of the product for human consumption. Due to effieient hygienic and modern technology, pathogens are rarely found in heat treated butter. The pathogenic bacteria can contaminate butter if made from contaminated cream. Moreover, the chanee of post-pasteurization eontamination may exist. Unfortunately, growth of pathogens in butter is not a determinant of shelf-life. That role is played by spoilage bacteria.

Careful attention is paid to temperature control in raw-milk-handling systems and, naturally, to the cleaning of all equipment.

Unfortunately, some of the lipolytic and proteolytic enzymes produced by psychrotrophs are heat stable, even surviving ultrahigh temperature (UHT) treatment. Today, a shelf life of many months is expected of a number of UHT-treated products, thus the presence of lipolytic and proteolytic enzymes can be disastrous. The only way to avoid this problem is to ensure that the numbers of organisms are kept to an absolute minimum during all stages of the collection and manufacturing process.

Recommendations :

Monitoring of the sanitary condition of butter and other dairy products during production and handling is an important task. Quality control and strict hygienic measures should be imposed to improve butter quality especially in the farm and on the small scale production.

Storing butter properly lengthens the shelf life so it can be used over a longer period of time. To prevent a type of spoilage called rancidity, protect butter from heat, light and air by storing it covered in the refrigerator. Rancid butter has an unpleasant taste and smell.

Butter absorbs odors from other foods rapidly. To prevent flavor changes, keep butter wrapped in moisture- and vapor-proof material or in tightly covered containers. For refrigerator storage, leave butter in its original wrapper. Opened portions of butter should be refrigerated in a covered dish.

Butter can be stored for up to two weeks at refrigerator temperatures. Higher temperatures cause off-flavors and unpleasant odors to develop. Butter should not be stored in the butter keeper (set at warmer temperatures) on the refrigerator door longer than two days. For ease in spreading, remove butter from the refrigerator 10 to 15 minutes before using it.

For holding longer than two weeks, butter should be frozen. To store butter in the freezer, wrap it in moisture- and vapor-proof freezer packaging material to keep the butter from absorbing odors from other foods and to prevent freezer burn.

Table (1): Bacterial counts of the examined butter samples from Alexandria markets.

Bacteria	Imported cow butter			Locally produced cow Butter			Locally produced buffalo butter		
	Min	max	mean ±SE	min	Max	mean ±SE	min	max	mean ±SE
Coliforms (MPN/gm)	<3	15	9.2 ± 1.3	15	64	32.2 ± 2.6	7.4	160	38 ± 5.8
Yeast and mold (CFU/gm)	1.8x10	8.6x10	4.3x10 ± 1.5 x10	1.7x10	2.9x10 ^{3}	$5.8x10^{2}$ ± $1.6x10^{3}$	4.2x10	9.6x10 ^{4}	$5.2x10^{3}$ ± $2.3x10^{3}$
Lipolytic bacteria (CFU/gm)	6.3x10	8.2x10 ^{3}	9.1x10 ± 1.1x10	$9.2x10^{2}$	5.3x10 ^{3}	$4.1x10^{3}$ ± 6.2x10	7.5x10 ^{3}	2.3x10 ^{3}	$5.9x10^{1}$ ± 6.1x10
Psychotrophic bacteria (CFU/gm)	$1.5x10^{2}$	8.2x10 ^{3}	$3.5x10^{2}$ ± $1.3x10^{2}$	2.3x10	9.5x10 ^{3}	$6.5x10^{2}$ ± $2.9x10^{3}$	4.3x10 ^{3}	7.6x10 ^{3}	$5.5x10^{3}$ ± 8.2x10

Table (2): bacterial pathogens isolated from the examined butter samples from Alexandria markets.

Bacteria	Imported cow butter		Locally produced cow Butter		Locally produced buffalo butter	
	+ve samples	%	+ve samples	%	+ve samples	%
Eschericia coli	1	5	4	20	3	15
Salmonella spp.	-	-	-	-	-	-
Shigella spp.	-	-	1	5	-	-
Staph. aureus	12	60	9	45	6	30
Listeria spp.	5	25	3	15	2	10

Table (3): Results of chemical examination of butter samples from Alexandria markets

Chemical examination	Imported cow butter			Locally produced cow Butter			Locally produced buffalo butter		
	min	max	mean ±SE	Min	max	mean ±SE	min	max	mean ±SE
p^H	4.5	5.8	5.2±0.03	4.99	5.99	5.4±0.2	5.3	6.1	5.5±0.4
Acid value	1.3	1.8	1.6±0.09	1.9	2.2	2.1±0.06	2.0	2.5	2.3±0.1
Moisture %	16.3	22.0	20±1.70	25	29	27±1.3	19	23	21±0.7
Sodium chloride %	0.09	1.8	1.3±0.10	1.1	2.3	1.8±0.3	1.7	3.1	2.9±0.3

Table (4): Sanitary condition of butter samples in comparison with the Egyptian Standard Specifications (2005)

Sanitary parameter	Egyptian Standard Specifications (2005)	Imported cow butter (n=20)		Locally produced cow Butter (n=20)		Locally produced buffalo Butter (n=20)	
		No. of samples over the permissible limit	%	No. of samples over the permissible limit	%	No. of samples within the permissible limit	%
Coliforms	<10/g	4	20	8	40	11	55
Yeast and mold	20	7	35	11	55	15	75
Lipolytic bacteria	0	20	100	20	100	20	100
Psychotrophics	0	20	100	20	100	20	100
Escherichia coli	0	1	5	1	5	3	15
Salmonella spp.	0	0	0	0	0	0	0
Shigella spp.	0	0	0	1	5	0	0
Staph. aureus	0	8	40	11	55	14	60
Listeria spp.	0	5	25	3	15	2	10
Moisture %	≤18 %	2	10	10	50	20	100
Sodium chloride %	≤2 %	0	0	5	25	7	35

REFERENCES

Ahmed, A. A.; Moustafa, M. K. & Abdel-Hakiem, E. H. (1987) : Sanitary condition of cooking butter manifactured in Assiut City. Assiut Med. Vet. J. 19 (37): 82-86.

Alad, A. S. (2002) : Criteria for evaluation of locally manufactured dairy products. A Thesis for PH. D milk hygiene. Fac. Vet. Med. Alexandria Univ.

Aman, I. M. (1985) : Incidence and significance of fungi in some dairy products. M. V. Sci Thesis, Fac. Vet. Med. Cairo Univ.

Andrews, W. H. & Hammack, T. S. (2001) : Food sampling and preparation of sample homogenate. US FDA/ CFSAN. Bacteriological Analytical Manual, 8th Edition.

Andrews, W. H. & Hammack, T. S. (2001) : Salmonella. US FDA/ CFSAN. Bacteriological Analytical Manual, 8th Edition

Andrews, W. H. & Jacobson, A. (2001): Shigella. US FDA/ CFSAN BAM.

AOAC (1990) : Official Methods of Analysis. 15th Ed. VOl. 2 Food Composition, Additives, Contaminants, Publ. AOAC Inc. Suite 40-2200 Wilson Boulevand, Arlingtm, Virginia / USA.

APHA, (1985) : Standard Methods for the Examination of Dairy Products. 15th Ed., American Public Health Association, New York.

Avramis, C. A.; Wang, H.; McBride, B. W.; Wrigh, T. C. & Hill, A. R. (2003) : Physical and processing properties of milk, butter, and cheddar cheese from cows fed supplemental fish meal. J Dairy Sci. 86(8): 2568-2576.

Bennet, R. W. & Lancette, G. A. (2001) : Staphylococcus aureus. US FDA/ CFSAN BAM.

Code of Federal Regulations (CFR), (1991) : US Standards for grades of Butter US Government Printing Office, Washington. DC.

Code of Federal Regulations (CFR), (2006) : Grading and inspection, General Specifications for Approved Plants and Standards for Grades of Dairy Products 1. PART 58 No. 345 (7CFR 58.345).

CODEX STAN A-1-1971, Rev.1 (1999) : amended in (2006): CODEX standard for butter

Cousin, M. A. (1982) : Presence and activity of Psychrotrophic microorganisms in milk and dairy products. A review. J. Food Prot., 45: 172-207.

El-Demerdash, M. S. (1990) : Chemical and bacteriological studies on some local and imported dairy products. M.V.Sc. Thesis, Fac. Agric. Zagazig Univ.

El-Gazzar, F. E. & Marth, E. H. (1992) : Salmonellae, Salmonellosis and dairy foods. A review. J. Dairy Sci., 75 (9): 2327-2343.

EOSQC (2005) : Egyptian Organization for Standardization and Quality Control.

ESS154-1/2005.Milk & Dairy products: natural cow butter.

FDA, (1992) : Evaluation and Definition of Potentially Hazardous Foods.

Analysis of Microbial Hazards Related to Time/Temperature Control of Foods for Safety, butter and margarine Chapter 4.

Feng, P., Wegant, S.D. & Grant M.A. (2001): Enumeration of E. coli and the coliform baeteria. US FDA/ CFSAN BAM.

Frank, J. F.; Christen, G. L. & Bullerman, L. B. (1992) : Tests for groups of microorganisms. In Standard Methods for the Examination of Dairy Products. 16th ed. APHA. P. 271.

Genevieve, L. C. (1993) : Analysis. In Dairy Science and Technology Handbook. Principles and Properties. (Y.H Hui ed.) VCH Publichers Inc. New York. USA.

Gonzalez, S.; Duncan, S. E.; O'Keefe, S. F.; Sumner, S. S. & Herbein, J. H. (2003) : Oxidation and Textural Characteristics of Butter and Ice Cream with Modified Fatty Acid Profiles. J. Dairy Sci. 86:70-77.

Harrigan, W. F. (1998) : Techniques for the microbiological examination of foods. In Laboratory Methods in Food Microbiology. 3rd Ed.

Hettinga, D. H. (1993) : Butter. In Y. H. Hui, ed., Encyclopedia of Food Technology, vol. 1, John Wiley & Sons, Inc., New York, pp. 231-237.

Hettinga, D. H. (2005) : Butter. In Bailey's Industrial Oil and Fat Products, Sixth Edition, Six Volume Set. Edited by Fereidoon Shahidi. Copyright John Wiley & Sons, Inc).

Hitchins, A. D. (2001) : Listeria monocytogenes. US FDA/ CFSAN BAM.

Im, Ji-Soon, & Marshall, R. (1998) : Effects of homogenization Pressure on the physical, chemical and sensory properties of formulated frozen. Food Sci. Biothechnol. 7(2): 90-94.

Lawrence, R. C. (1976) : Microbial lipases and related esterases. Part 1 deteetion, distribution and production of mierobial lipases. Dairy Sei Abst., 29: 1-8.

Lewis, H. C.; Little, C. L.; Elson, R.; Greenwood, M.; Grant, K. A. &, McLauchlin, J. (2006) : Prevalence of Listeria monocytogenes and other Listeria species in butter from United Kingdom produetion, retail, and catering premises. J Food Prot, 69(7): 1518-26.

Luppi, A. & Bucci, G. (1982) : Isolation of Yersinia enterocolitica from food in the province of Ferrara. Boll. Ist. Sieroter Milan. 61 (2): 158-160).

Iyaijala, R.; Lyytikainen, O.; Autio, T.; Aaltto, T.; Haaviato, L. & Honkanen-Buzalski, T. (2001) : Exposure of Listeria monocytogenes within an epidemic caused by butter in Finland. Int. J. Food microbial. 70 (1-2): 97-109.

Massa, S.; Gesaroni, D. & & Trovatelli, L.

D. (1990) : The incidence of Listeria species in soft cheese, butter and raw milk in the province of Bologna. J. Apll. Bacteriol., 68: 153-156.

Mohamed, S. M.; Abdel-Rahman, H. A.; Morgan, S. D. & Hafez, R. S. (1983) : Mycological studies on Egyptian soft cheese and cooking butter. Assul Vet. Med. J., 11 (21): 151-155.

Murphy, M. F. (1990) : microbiology of butter. In Dairy Microbiology. Vol. II. 2nd Ed. (Robinson, R.K., ed.) Elsevier Applied Science. London and New York.

Nazem, A. M. (1991) : Assessment of the hygienic quality of some dairy products. Ph.D. Thesis, Fac. Vet. Med. Alex. Univ.

Nawar, Dalia, M. M. (2001) : Hygienic quality of some street-vended dairy products. M. V. Sc. Thesis Fac. Vet. Med. Alex. Univ.

Patler, B.; Guven, A. & Soltan, S.(1995) : Studies on the quality of butter consumed in Elazig (Turkey). Veteriner Bilimeri Dergisi, 11 (1): 77-81. Dairy Sci. Abstract., 58 (6): 458.

US standards for grades of butter, 1992

Rajarman, S.; Narasimhan, R. & Khan, M. M. H. (1994) : Identification of yeasts and moulds in butter and lipolytic study of selected moulds. Indian J. Dairy Sci., 47 (4): 341-345.

Sabreen, M. S. (1996) : Microbiological quality of imported and local processed cheeses and butter. 7th Sci. cong. 17-19 November, Fac. Vet. Med. Assiut Univ.

Saleh, Omayma A. A. (1995) : Chemical and microbiological parametersaffecting on keeping quality of some dairy products. Ph. D. Thesis, Fac. Vet. Med, Alex. Univ.

Santos, E. G., Dos. C.; Raimundo, S. M. & Robbs, P. G. (1995) : Microbiological evaluation of butter purchased from a market of Rio de Janiero, 1. Indicator and pathogenic microorganisms. Revista de Microbiologia. 26 (3): 224-229.

Tasnim, K.; Khalid, R. & Chaudhry, M. Y. (1993) : Microbiological status of different varieties of butter. Science International, 5 (1): 81-83.

Tournas, V.; Stack, M. E.; Mislivek, P. B.; Kock, H. A. & Bandler R. (2001) : Yeasts, Molds and mycotoxins. US FDA/ CFSAN BAM

Zhao, T.; Doyle, M. P. & Berg, D. E. (2000) : Fate of Campylobacter jejuni in butter. J. Food Prot. 63 (1): 120-122). (ISSN: 0362-028x).

الملخص العربى

التقييم الصحى للزبد المباع بأسواق الإسكندرية

سوسن محمد لبيب الششنجى* نبيله فؤاد السيد* وفاء محمد عيسى**

معمل بحوث صحة الأغذية بجمرك الإسكندرية - معهد بحوث صحة الحيوان*

المعمل البيطرى بالإسكندرية - معهد بحوث صحة الحيوان**

لقد أجريت الدراسة على ٦٠ عينة (٢٠ عينة من كل من الزبد البقرى المستورد والزبد البقرى المحلى والزبد الجاموسى المحلى) التى تم جمعها من مختلف أسواق الإسكندرية، وقد خضعت العينات للفحص الميكروبيولوجى والتحليل الكيميائى لتقييم الحالة الصحية لهذه العينات استناداً إلى المواصفات القياسية المصرية، ولقد أسفرت نتائج الفحص الميكروبيولوجى عن أن ٢٠٪ من عينات الزبد المستورد و ٤٠٪ من الزبد البقرى المحلى و٥٥٪ من عينات الزبد الجاموسى المحلى غير مطابقة للمواصفات القياسية المصرية من حيث العد البكتيرى للميكروبات القولونية وكان متوسط إعدادها ٢ر٩ ± ٣ر١ و ٢ر٣٢ ± ٢ر٦ و ٣٨ ± ٥ر٨ على التوالى، كما أن ٣٥٪ من عينات الزبد المستورد و ٥٥٪ من الزبد البقرى المحلى و٧٥٪ عينات الزبد الجاموسى المحلى قد تجاوزت الحد المسموح به للفطريات والخمائر وكان متوسط إعدادها ٤ر٣ × ١٠ ± ٥ر١ × ١٠ خلية / جرام و ٥ر٨ × ١٠^٢ ± ٦ر١ × ١٠^٢ خلية / جرام و ٢ر٥ × ١٠ ± ٣ر٢ × ١٠^٢ خلية / جرام على التوالى، أما البكتيريا المقاومة للبرودة والبكتيريا المحللة للدهون فقد تم عزلها من جميع العينات وبمتوسط إعداد ١ر٩ × ١٠ ± ١ر١ × ١٠ خلية / جرام و ١ر٤ × ١٠^٣ ± ٢ر٦ × ١٠ خلية / جرام و ٩ر٥ × ١٠^٢ ± ١ر٦ × ١٠ خلية / جرام على التوالى للبكتيريا المحللة للدهون و ٥ر٣ × ١٠^٢ ± ٣ر١ × ١٠^٢ خلية / جرام و ٥ر٦ × ١٠^٢ ± ٩ر٢ × ١٠^٢ ± ٩ر٢ × ١٠^٢ خلية / جرام و ٥ر٥ × ١٠^٣ ± ٢ر٨ × ١٠ خلية / جرام على التوالى للبكتيريا المقاومة للبرودة، ولقد أسفرت نتائج هذه الدراسة أيضاً عن أنه خلو جميع العينات من السالمونيللا بينما تم عزل ميكروب الشيجللا من عينة واحدة تمثل ٥٪ من عينات الزبد البقرى المحلى، أما المكور العنقودى الذهبى فقد تم عزله من ٤٠٪ و ٥٥٪ و ٦٠٪ من عينات الزبد المستورد وعينات الزبد البقرى المحلى وعينات الزبد الجاموسى المحلى على التوالى، فى حين أن ميكروب اللبستريا قد تواجد بنسبة ٢٥٪ و ١٥٪ و ١٠٪ على التوالى.

وقد أسفرت نتائج التحليل الكيميائى للعينات عن تجاوز ١٠٪ و٥٠٪ و ١٠٠٪ من هذه العينات للحدود المسموح بها لمحتوى الرطوبة وكذلك أسفرت عن تجاوز ٢٥٪ من عينات الزبد البقرى المحلى و٣٥٪ من عينات الزبد الجاموسى المحلى للمحتوى المسموح به لكلوريد الصوديوم.