MICROBIOLOGICAL AND CHEMICAL STUDIES ON FERMENTED MILK (ZABADY) PRODUCED BY SMALL ARTISANS IN ASSIUT CITY

KHODEAR, MANAL M.[1], ABEER F. ZAYAN[2], NOUR EL-HODA E. HANAFY[3] AND A. I. HASSAN[3]

1. *Agricultural Research Center, Food Technology Research institute, Assiut.*
2. *Agricultural Research Center, Food Technology Research Institute, Giza.*
3. *Dairy Department, Faculty of Agriculture, Assiut unirersity, Assiut.*

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Abstract

The evaluation of quality and keeping quality of zabady produced at Assiut city by small artisans was the aim of the research.

Zabady samples were collected from six small dairies in Assiut city and stored at 5±2ºC in their containers representing the first group of samples.

As soon as samples of the first group arrived to the laboratory, one cup from each sample was used as a starter for manufacturing experimental zabady (the second group of samples) in reconstituted skim milk (NIDO, 11%W/V) in distilled water.

All samples were analysed daily for: total bacterial count, count of lactic acid bacteria, coliform and yeast & mold. As well, all samples were chemically examined for: pH, acidity, total solids, fat, total nitrogen, total protein and soluble nitrogen content. Regarding samples of the group I the surface layer of one cup was asceptically removed, then the surface portion and the bottom portion were microbiologically analysed separately. On the other hand samples of the group II were analysed as one portion.

The obtained results showed that at the beginning of incubation period their was minor difference between the 2 portions of the group I and group II of samples concerning the total bacterial count. However at the end of the incubation period some times the surface layer contained higher bacterial counts as compared with the bottom layer or with group II samples.

On the other hand, the total lactic acid bacteria (L.A.B) counts showed that the difference between different samples was not great.

Regarding yeast and mould, the minimum count reached in group I after 5 days and group II after 7 days and the maximum count reached in group I after 5 days.

Only 2 samples both from the I and II group were positive for coliforms overall the storage period.

Concerning chemical determinations, the pH of all samples of the group I were lower compared to samples of the group II, on the other hand the acidity was higher.

Only one sample from group I contained highest T.S. when compared to all other samples, in the mean time, all samples of group II always contained higher T.S.

Concerning fat content, there were great differences, between fresh samples of group I with minimum value of 2.5% and a maximum value of 4.7%. Also, percentage of total protein showed the same trend with a minimum value of 2.676% and 3.662% as a maximum.

The obtained results showed great differences concerning the S.N content between samples of group I either at the beginning and at the end of storage period.

The organoleptic properties examination indicated that their was big difference between the different samples of the first group, which may be due to the difference in the raw milk used by each dairies, on the other side approximately their was no big difference between the samples of the second group, as no big difference between the raw material used for manufacturing , also the samples of the second group always had higher score in comparison with the samples of the first group, normally this can be explained by the quality of the raw material used and the manufacturing process.

INTRODUCTION

Yoghurt is one of the most popular fermented dairy products widely consumed all over the world. It is obtained by lactic acid fermentation of milk by the action of a starter culture containing *Streptococcus thermophilus* and *Lactobacillus delbrueckii* ssp. *bulgaricus*. The role of these two genera in yoghurt manufacture can be summarized as milk acidification and synthesis of aromatic compounds (Serra, et. al, 2009 and Sahan, et. al, 2008).

Yoghurt is more nutritious than many other fermented milk products because it contains a high level of milk solids in addition to nutriments developed during the fermentation process. Different forms of yoghurt are now available in the market like stirred, set, frozen and liquid yoghurt.

To preserve its inherent quality during storage and, in particular, its physicochemical and sensory characteristics, packaging is essential (Saint-Eve, et. al, 2008).

Yoghurt can be stored for up to two weeks. During this period, the product undergoes changes of physico-chemical and rheological properties that may affect its organoleptic quality.

Zabady is very popular dairy product in Egypt. It is highly nutritious food as it prevents the intestinal putrefaction resulting from the anaerobic decomposition (Robinson, 1991).

It is considered to be more digestible than raw milk due to the limited proteolysis by starter culture and formation of free amino acids (Groux, 1973).

Yoghurt has a low pH and contains good quality protein, so it considered an excellent medium for growth of many species of fungi (Marth and Steale, 2001).

Preparing Zabady which is free from defects in body, consistency and flavor continues to be a problem in at small produceres.

So the present work was undertaken to follow the changes in the microbiological and chemical qualities of Zabady produced by small artisans in comparison with that produced at the laboratory.

MATERIALS AND METHODS

A-Collection of samples:

A total of 24 samples were collected from 6 small dairies in Assiut city 4 times from each dairy, 15 cups each time representing the first group (group I) of samples (A, B, C, D, E and F).

As soon as it was arrived in the laboratory it was used for manufacturing the second group (group II- samples a, b, c, d, e and f) of sample in reconstituted skim milk (NIDO, 11% W/V).

B-Preparation of samples:-

Samples were prepared following the procedures described by the American Public Health Association (A.P.H.A, 1992). Milk was inoculated by 1 % of starters after shaking the milk gently; it was powered in 120 cc covered plastic cups. Incubation had been carried out at 37ºC for 2 hr. Then cups were transferred to refrigerator at 5± 2ºC up to the end of storage period.

C-Examination of samples:-

Each sample was subjected to the following examinations:-

1) Determination of titratable acidity percentage as described by A.O.A.C (1975).
2) Coliform count (most probable number MPN):- determination of coliform was carried out according to the international standard (IDF 1971).
3) Yeast and mould counts:- was carried out according to the international standard (IDF1971).
4) Total protein was determined according to the international standard (IDF 1962).
5) Total solids were determined according to the international standard (IDF1987).
6) Lactic acid bacteria was determined according to the international standard (IDF1988).

7) Panelitest had been carried out according to EL-Hofi et.al., (1991) as in the following system:-

	Points
Flavor	50
Body and texture	40
General appearances	10
	—
	100

The test had been carried out by 10 person from the stuff member of the dairy science department faculty of Agriculture, Assiut University

RESULTS AND DISCUSSION

The results recorded in Table (1) show that the total solids percentage of the examined group I yoghurt samples obtained from small dairies ranged from 9.77 to 12.68% in the first day of validity, it reached 9.94 and 12.91% at the fourth day of validity.

The changes in the T.S content can be explained by the increasing the percentage of acidity as presented in Table (1) which showed that the acidity percentage of the group I samples ranged from 0.79-1.50 % the first day of validity, and it reached 1.13-1.59 % after 4 days of incubation respectively. The corresponding values for the second group of samples were 0.80-1.50% and 0.93-1.59% at the first and fourth day of incubation , the increases in the acidity causes shrinkage of the curd and separation of small amount of whey on the surface of the yoghurt leading to the increase in the T.S content, similar results were recorded by Abdel-Hakeim (1986) and EL-Bessery (2001).

From the data presented in Table (1) the fat percentage in the group I samples varied from 2.5 to 4.7%, which indicates that small dairies used different kinds of milk, i.e. cows milk, cows milk mixed with buffalo milk.

The same trends can be seen in Table (1) regarding total protein content in different samples where the percentage of T.P in group I samples varied in the first day of validity from 2.676 to 3.662% with an average 3.169%.

The corresponding values for the second group of samples ranged from 2.501 to 3.394% with an average of 2.947%.

Table 1. Changes in T.S, Fat, T.P, S.N, Acidity and pH in Fermented Milk (Zabady) Through the Shelf -Life Time in Refrigerator.

deter	T.S %					Fat %					T.P %					S.N %					Acidity %					pH				
samples	Storage period /days																													
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
A	10.	10.	10.	10.	11.	2	-	-	-	2	2.6	-	-	-	3.5	0.1	-	-	-	0.2	1.	1.1	1.	1.	1.	3.	3.	3.	3.	3.
a	11.	11.	10.	11.	11.	3	-	-	-	3	3.3	-	-	-	3.5	0.0	-	-	-	0.1	0.	0.8	0.	0.	0.	4.	4.	4.	4.	4.
B	11.	12.	10.	12.	12.	3	-	-	-	4	3.5	-	-	-	3.3	0.1	-	-	-	0.1	1.	1.2	1.	1.	1.	3.	3.	3.	3.	3.
b	11.	11.	11.	11.	11.	3	-	-	-	3	2.5	-	-	-	3.3	0.1	-	-	-	0.1	0.	0.9	1.	1.	1.	4.	4.	4.	4.	3.
C	9.7	9.7	10.	9.9	9.5	3	-	-	-	3	2.6	-	-	-	2.9	0.0	-	-	-	0.0	1.	1.5	1.	1.	1.	3.	3.	3.	3.	3.
c	11.	11.	10.	10.	10.	3	-	-	-	3	2.9	-	-	-	3.0	0.0	-	-	-	0.0	1.	1.3	1.	1.	1.	3.	3.	3.	3.	3.
D	12.	12.	12.	12.	12.	3	-	-	-	4	3.3	-	-	-	3.4	0.0	-	-	-	0.0	1.	1.2	1.	1.	1.	3.	3.	3.	3.	3.
d	11.	11.	11.	11.	12.	3	-	-	-	3	3.2	-	-	-	3.3	0.1	-	-	-	0.1	1.	1.5	1.	1.	1.	3.	3.	3.	3.	3.
E	11.	11.	9.7	11.	9.7	4	-	-	-	4	3.5	-	-	-	3.6	0.0	-	-	-	0.1	1.	1.0	1.	1.	1.	3.	3.	3.	3.	3.
e	11.	11.	12.	11.	12.	3	-	-	-	3	3.2	-	-	-	3.2	0.0	-	-	-	0.1	1.	1.1	1.	1.	1.	4.	3.	3.	3.	3.
F	12.	12.	14.	12.	13.	4	-	-	-	5	3.6	-	-	-	3.9	0.0	-	-	-	0.0	0.	1.0	1.	1.	1.	3.	3.	3.	3.	3.
f	11.	11.	10.	10.	11.	3	-	-	-	4	3.1	-	-	-	3.5	0.0	-	-	-	0.0	0.	0.9	0.	0.	0.	3.	3.	3.	3.	3.

-A, B, C, D, E and F representing samples manufactured by small dairies in Assiut cit

-a′, b′, c′, d′, e′ and f′ representing samples manufactured in reconstituted skim milk (11%w/v) in distilled water

The data presented in Tables (2) and (3) show that higher total bacterial count and LAB count were detected in the surface portion in group I samples as compared with the bottom portion, ranges being 12.5×10^2 - 78.5×10^5 cell/g for the surface portion, and 2.5×10^2 - 34.5×10^5 cell/g for the bottom portion at the first day of validity. The corresponding range for the second group samples was 17×10^2 - 85×10^5 cell/g respectively.

Table 2. Changes in total bacterial count in Fermented Milk (Zabady) through the shelf life time in refrigerator.

Samples		Storage period/days					
		1	2	3	4	5	7
A	S	64.5×10^2	49.0×10^5	35.0×10^5	85.0×10^5	32.0×10^6	-
	B	85.0×10^4	65.0×10^4	45.0×10^4	90.0×10^4	55.0×10^4	–
a		59.5×10^4	59.5×10^5	68.5×10^5	87.5×10^5	-	60.5×10^5
B	S	78.5×10^5	76.0×10^5	46.0×10^6	56.0×10^6	13.8×10^7	–
	B	34.5×10^5	13.0×10^5	19.5×10^5	49.0×10^5	89.5×10^5	–
b		22.0×10^5	59.0×10^5	86.0×10^5	16.8×10^6	–	17.0×10^6
C	S	45.0×10^2	53.0×10^2	9.5×10^2	24.5×10^2	99.5×10^2	–
	B	2.5×10^2	4.0×10^2	14.0×10^2	8.0×10^2	18.5×10^2	–
c		26.5×10^3	93.5×10^2	28.0×10^3	62.5×10^2	-	60.6×10^2
D	S	26.0×10^2	14.3×10^2	25.5×10^2	1.0×10^2	54.5×10^2	–
	B	29.5×10^2	1.0×10^2	53.0×10^2	1.5×10^2	21.5×10^2	–
d		17.0×10^2	21.0×10^4	10.0×10^2	3.0×10^3	-	16.0×10^4
E	S	26.5×10^3	15.6×10^5	52.2×10^5	47.5×10^5	35.5×10^5	–
	B	43.5×10^2	17.4×10^2	12.8×10^2	39.0×10^2	77.0×10^2	–
e		85.0×10^5	90.0×10^4	11.0×10^3	57.0×10^5	–	63.5×10^5
F	S	12.5×10^2	50.0×10^3	46.5×10^4	30.0×10^5	40.5×10^5	–
	B	31.5×10^2	15.0×10^3	34.0×10^4	50.0×10^4	61.0×10^4	–
f		20.5×10^5	24.0×10^5	83.5×10^5	69.5×10^5	–	77.0×10^5

A, B, C, D, E and F : representing samples manufactured by small dairies in Assiut city

a, b, c, d, e and f : representing samples manufactured in reconstituted skim milk (NIDO 11 %W/V).

S : representing surface portion of the cups.

B : representing bottom portion of the cups

Table 3. Changes in Count of L.A.B. in Fermented Milk (Zabady) Through the shelf life time in refrigerator.

Samples		Storage period/days					
		1	2	3	4	5	7
A	S	77.5×10^5	65.0×10^5	52.5×10^5	91.0×10^5	48.0×10^6	–
	B	74.5×10^4	68.0×10^4	61.5×10^4	18.25×10^5	10.4×10^5	–
a		68.5×10^4	73.5×10^4	71.5×10^5	69.0×10^5	–	78.0×10^5
B	S	121.0×10^5	58.0×10^5	57.5×10^6	51.0×10^6	10.75×10^7	–
	B	80.5×10^4	15.65×10^5	26.0×10^5	19.85×10^6	11.65×10^6	–
b		24.5×10^5	47.0×10^5	84.5×10^5	13.35×10^6	–	25.5×10^6
C	S	14.0×10^2	38.5×10^2	10.0×10^3	50.0×10^3	95.0×10^3	–
	B	25.0×10^2	40.0×10^3	8.5×10^4	2.0×10^4	42.5×10^3	–
c		27.5×10^2	116.0×10^2	48.0×10^2	44.0×10^2	-	33.5×10^2
D	S	25.0×10^3	98.5×10^3	20.0×10^3	38.5×10^3	71.0×10^4	–
	B	97.5×10^3	45.0×10^3	11.4×10^3	32.5×10^3	38.5×10^4	–
d		11.5×10^5	82.5×10^4	62.0×10^5	13.4×10^5	-	42.5×10^3
E	S	25.0×10^3	85.0×10^4	18.0×10^4	65.0×10^4	85.0×10^3	–
	B	64.0×10^2	73.0×10^3	37.0×10^3	30.0×10^3	18.0×10^3	–
e		24.5×10^3	72.0×10^3	22.5×10^3	42.5×10^2	-	35.5×10^5
F	S	7.0×10^2	33.5×10^3	55.5×10^4	28.0×10^5	35.0×10^5	–
	B	32.0×10^2	17.0×10^3	37.5×10^4	37.5×10^4	98.0×10^4	–
f		17.75×10^5	37.5×10^5	86.0×10^5	69.0×10^5	–	97.0×10^5

Coliforms still continue to be considered as indicator organisms of choice in examining milk and milk products for pin pointing the unhygienic conditions during milking, handling and distribution.

Realizing the results recorded in Table (4) indicate that only one third of group I yoghurt samples was found to be positive for coliform. The same result was found in the samples of the second group manufactured by using the respective contaminated samples as a starter. Similar results were detected by Abdel-Hakeim (1986) and EL-Bessery (2001), it is noteworthy from their study that the drastic reduction in number of coliforms in yoghurt throughout the shelf life time may be due to the increase in acidity. Also, it is worthy to state that the combination

Table 4. Changes in Count of Coliform in Fermented Milk (Zabady) through The shelf life time in refrigerator.

Samples		Storage period/days					
		1	2	3	4	5	7
A	S	00.00	00.00	00.00	00.00	00.00	–
	B	00.00	00.00	00.00	00.00	00.00	–
a		00.00	00.00	00.00	00.00	–	00.00
B	S	110.0	15.00	2.50	2.50	2.50	–
	B	110.0	4.50	9.50	45.00	2.50	-
b		110.0	45.00	25.00	45.00	–	4.50
C	S	00.00	00.00	00.00	00.00	00.00	–
	B	00.00	00.00	00.00	00.00	00.00	–
c		00.00	00.00	00.00	00.00	-	00.00
D	S	00.00	00.00	00.00	00.00	00.00	–
	B	00.00	00.00	00.00	00.00	00.00	–
d		00.00	00.00	00.00	00.00	–	00.00
E	S	00.00	00.00	00.00	00.00	00.00	–
	B	00.00	00.00	00.00	00.00	00.00	–
e		00.00	00.00	00.00	00.00	–	00.00
F	S	15.00	7.50	1.50	45.00	15.00	-
	B	45.00	15.00	4.50	2.50	2.50	-
f		25.00	15.00	45.00	45.00	-	25.00

of *lactobacillus delbrueckii ssp bulgaricus* and *streptococcus thermaphilus* present in yoghurt have strong contrary effect against the growth and survival of the coliforms.

Yeast and moulds may grow over an extremely wide range of temperature; therefore, they can be present practically on all food at almost any temperature under which food is held. Various species of fungi play an important role in spoilage and discoloration of food. Also, they are considered undesirable organisms because they affect the flavor, producing musty odour and bitter taste. It is commonly accepted that the presence of yeasts and mould in yoghurt is also indicative of poor sanitary practices in manufacturing and packaging.

The results pointed that only one third of group I samples were free of yeast and mould in the first day of validity.

The average count of yeasts and moulds increased in the second day reached a range of 11.5×10 to 42.5×10^5 cfu/g in the surface layer of the first group while the corresponding ranges for the bottom layer of the group I

Table 5. Changes in Count of Yeast and Mould in Fermented Milk (Zabady) Through the shelf life time in refrigerator.

Samples		Storage period/days					
		1	2	3	4	5	7
A	S	37.5×10^5	42.5×10^5	47.5×10^5	110.5×10^5	150.0×10^5	-
	B	24.4×10^4	40.2×10^4	56×10^4	95.5×10^4	40.0×10^4	-
a		42.0×10^5	62.5×10^4	53.5×10^5	59.5×10^5	-	79.5×10^5
B	S	26.6×10^5	19.0×10^5	31.9×10^5	11.9×10^5	22.95×10^5	–
	B	67.5×10^4	80.5×10^4	10.45×10^5	26.8×10^5	14.75×10^5	–
b		14.25×10^5	79.5×10^4	21.3×10^4	77.5×10^4	–	94.0×10^4
C	S	00.00	00.00	2.0×10^2	13.5×10^2	47.5×10^2	–
	B	00.00	00.00	00.00	00.00	3.5×10^2	–
c		00.00	2.0×10^2	15.5×10^2	00.00	–	00.00
D	S	00.00	11.5×10	00.00	40.0×10	00.00	–
	B	00.00	14.0×10	00.00	00.00	00.000	–
d		19.0×10	22.0×10^2	55.0×10	00.00	-	35.5×10^2
E	S	19.8×10^3	10.0×10^4	12.7×10^4	63.0×10^4	75.5×10^4	–
	B	34.0×10^2	15.4×10^3	19.0×10^3	82.5×10^3	22.0×10^3	–
e		73.0×10	23.0×10^2	14.45×10^3	35.5×10^3	–	34.5×10^3
F	S	15.5×10	25.0×10^3	13.0×10^4	11.1×10^4	89.5×10^3	–
	B	18.0×10^2	12.5×10^3	19.85×10^4	15.1×10^4	98.0×10^3	-
f		30.0×10^3	62.0×10^3	16.8×10^4	99.0×10^3	–	33.5×10^3

samples and the second group samples were 14×10 - 80.5×10^4 cfu/g and 2×10^2 - 79.5×10^4 cfu/g respectively.

The results obtained by Abdel-Hakein (1986) are in agreement with the obtained results, while Arnott et al., (1974) recorded better results. The latter found that only one quarter of the samples analyzed was unsatisfactory owing to yeast contamination and almost one fifth was unsatisfactory owing to mould contamination in yoghurt commercially produced in Canada.

As the storage period prolonged the count of yeast and mould increased up to the fifth day, then it completely covered the surface of the group I samples, the obtained results are in agreement with the results obtained by Ali et al., (2004).

Concerning yoghurt quality produced by small dairies in Assiut as measured by microbiological evaluation indicate the need for emphasis on total quality control within processing plants against air pollution after milk heat treatment, i.e. during packaging, incubation and cold storage.

Table (6) presented the results obtained from the organoleptic properties examination, it can be seen that their was big difference between the different samples of the first group, which may be due to the difference in the raw milk used by each dairies, on the other side approximceteily their was no big difference between the samples of the second group, as no big difference between the raw material used for manufacturing , also the samples of the second group always had higher score in comparison with the samples of the first group, normally this can be explained by the quality of the raw material used and the manufacturing process.

Table 6. Organoleptic properties of fermented milk (Zabady) after 5 day´s of Storage at 5± 2ºC.

Samples	Flavor (50)	Body and texture (40)	Appearance (10)	Total (100)
A	40.67	33.50	8.00	82.17
a	43.40	34.00	8.20	84.70
B	41.40	34.20	8.20	83.80
b	42.77	35.54	8.47	86.78
C	38.10	30.80	7.40	76.30
c	41.40	33.20	8.00	82.60
D	44.70	35.07	8.30	88.07
d	43.80	35.30	8.40	84.50
E	42.70	31.80	8.43	82.93
e	43.40	33.40	8.54	85.34
F	43.20	36.12	8.60	87.92
f	43.00	35.80	8.40	87.20

A, B, C, D, E and F : representing samples manufactured by small dairies in Assiut city

a, b, c, d, e and f : representing samples manufactured in reconstituted skim milk (NIDO 11 %W/V).

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دراسات ميكروبيولوجية وكيميائية على الألبان المتخمرة (الزبادي) المنتجة بصغار الحرفيين بأسيوط

منال محمد خضر1 ، عبير فؤاد زيان2 ، نور الهدى محمود حنفي3، على إسماعيل حسن3

1. *معهد بحوث تكنولوجيا الأغذية – أسيوط*
2. *معهد بحوث تكنولوجيا الأغذية – جيزة*
3. *قسم الألبان – كلية الزراعة – جامعة أسيوط*

استهدف البحث الحالى تقييم جودة وقوة حفظ الزبادى المنتج بواسطة صغار الحرفيين فى مدينة اسيوط حيث تم تجميع عينات الزبادي المستخدمة في هذه الدراسة من عدد 6 معامل ألبان صغيرة في مدينة أسيوط وحفظت في الثلاجة على درجة حرارة 5±2°م لمدة 4–5 أيام وهذه تمثل المجموعة (I).

وبمجرد وصول عينات المجموعة (I) للمعمل استخدام كوب زبادي من كل عينة كبادئ لصناعة زبادي بالمعمل يمثل المجموعة (II) باستخدام لبن فرز معاد استرجاعه (لبن نيدو 11% وزن /حجم) باستخدام ماء مقطرو حفظت جميع العينات في الثلاجة على درجة حرارة 5±2°م واجري عليها يوميا تحليلات :– العد الكلي للبكتريا , العد الكلي لبكتريا حمض اللاكتيك , بكتريا الكوليفورم , الخمائر والفطريات . كذلك أجريت بعض الاختبارات الكيميائيه ومنها pH , الحموضه , الجوامد الكليه , الدهن , النيتروجين الكلي , البروتين الكلي و النيتروجين الذائب .وفي كل مرة يستخدم 2 كوب من المجموعه (I) وكوب من المجموعة (II) .

فيما يخص المجموعة (I) يتم إزالة سطح العبوة في جو معقم واجريت التحليلات الميكروبيولوجيه على كل من الجزء السفلي والعلوي وعلى جانب آخر تم تحليل عينات المجموعة (II) كقطعة واحدة .

النتائج المتحصل عليها أظهرت انه لا توجد اختلافات جوهريه في بداية مدة التحضين ما بين الجزئين (السطحى و السفلي) للمجموعة (I) و المجموعة (II) فيما يخص العدد الكلي للبكتريا الا انه في نهاية مدة التحضين بصفة عامة احتوت الطبقة السطحية على عدد بكتيري اعلى مقارنة بالطبقة السفلى. ومن ناحية اخرى لوحظ عدم وجود اختلافات كبيرة فى العدد الكلي لبكتريا حمض اللاكتيك بين العينات المختلفة. أما بالنسبة للخمائر و الفطريات فان الحد الأدنى وصل في المجموعة (I) بعد 5 أيام وفى المجموعة II بعد 7 أيام والحد الأقصى للعد وصل فى المجموعة I بعد 5 أيام من التخزين كما وجد ان عينتين فقط من كلا من المجموعة (I) و (I I) كانت موجبة لاختبار الكوليفورم طول فترة التخزين .

بالنسبة للتحليلات الكيميائية فان الـ pH لكل عينات المجموعة (I) كان منخفض مقارنة بعينات المجموعة (II) , بينما نجد الحموضة مرتفعة .عينه واحدة فقط من مجموعة 1 احتوت على

اعلى قيمة للجوامد الكليه عند مقارنتها بكل العينات الاخرى .اما بالنسبة للمحتوى من الدهن فلقد وجدت اختلافات قوية ما بين عينات المجموعة (I) بحد ادنى 2.7 % وحد اقصى 4.7 % , كذلك النسبة المؤية للبروتين أظهرت نفس الاتجاه بحد ادنى 2.676% وحد اقصى 3.662 % . كما ظهرت النتائج اختلافات قوية فيما يخص النيتروجين الذائب ما بين عينات المجموعة II) سواء كانت في بدايه أو نهايه مدة التخزين .

بصفة عامة يوصى بضرورة مراعاة المزيد من التركيز على رقابة الجودة الشاملة فى المعامل الصغيرة من حيث الشؤن الصحية ومن حيث التلوث الهوائى بعد المعاملة الحرارية للبن المعد للصناعة خاصة أثناء التعبئة والتحضين وخلال الحفظ فى الثلاجة كذلك ضرورة العمل على توفير مصدر ميسور وامن لمزارع بادىء الزبادي لصغار المنتجين حيث ثبت أن حوالي 3/1 عينات السوق كانت ملوثة ببكتريا القولون مما يشكل خطورة شديدة على صحة المستهلكين.

بإجراء الاختبارات الحسية وجد اختلافات كبيرة ما بين عينات المجموعة الأولى وذلك يرجع إلى اختلاف اللبن الخام المستخدم لكل من صغار المصنعين ومن جهة أخرى لا يوجد اختلافات كبيرة في عينات المجموعة الثانية نظرا لعدم اختلاف المواد الخام الأولية المستخدمة في التصنيع أيضا حصلت عينات المجموعة الثانية على اعلي القيم الحسية في التحكيم الحسى وهذا يرجع إلى استخدام لبن خام نظيف في عملية التصنيع.