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INDICATOR MICROORGANISMS AS INDICES OF QUALITY FOR MILK AND SOME DAIRY PRODUCTS

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ABSTRACT

A total of 150 samples including raw cow's milk, pasteurized milk, small scale ice cream, large scale plain and flavored yoghurt (30 of each) were collected randomly from dairy shops, super markets and small scale ice cream producers in Fayoum city, Egypt and examined for sanitary and microbiological status. The result revealed that the mean value of titratable acidity % in plain and flavored yoghurt were 1.41± 0.02 and 1.67± 0.04, respectively. The mean values of total *Coliforms* were $7.5\times10^5\pm 3.9\times10^5$, $8.25\times10^2\pm 5.04\times10^2$, $8.2\times10^4\pm 4.1\times10^4$, $4.83\times10^2 \pm 3.15\times10^2$ and $2.72\times10^3\pm 9.5\times10^2$ cfu/mlorg., respectively. While the mean values of *Faecal coliforms* were $2.8\times10^4\pm 1.5\times10^4$, $1.16\times10^2 \pm 7.11\times10$, $1.02\times10^3 \pm 1.71\times10^2$, $2.01\times10\pm 1.07\times10$ and $3.13\times10^2\pm 1.30\times10^2$ cfu/mlorg., respectively. The mean values of *E.coli* were $1.38\times10^3\pm 6.89\times10^2$,$1.84\times10 \pm 9.5$, $4.87\times10^2\pm1.18\times10^2$, $1.36\times10\pm 8.4$ and $4.68\times10\pm 1.50\times10$ cfu/mlorg. The mean values of *Enterococci* were $1.12\times10^6\pm 1.29\times10^5$, $2.1\times10^3\pm 4.20\times10^2$, $1.1\times10^6 \pm1.87\times10^5$, $2.23\times10^3\pm 6.29\times10^2$ and $7.77\times10^3\pm1.67\times10^3$ cfu/mlorg., respectively. *Staph. aureus* was detected in the examined raw cow's milk and small scale ice cream samples, with the mean values of $1.98\times10^5 \pm 3.91\times10^4$ and $7.65\times10^4 \pm 2.41\times10^4$ cfu/mlor g., respectively, but was not detected in the other samples. Total *yeasts* and *moulds* were detected in the examined large scale plain and flavored yoghurt samples with mean values of $1.15\times10^2\pm 3.59\times10$ and $4.48\times10^2\pm 8.17\times10$ (cfu/mlor g.), respectively.

Key words: Raw cow's milk, pasteurized milk, ice cream, plain yoghurt, flavored yoghurt, *coliforms, E.coli, enterococci, Staph.aureus, yeasts, moulds,* titratable acidity

INTRODUCTION

Milk is considered the most prevalent food stuff among consumers. Where it supply the body with the nutritional needs from protein, fat, carbohydrates, minerals, fat and water soluble vitamins which are necessary for growth and building body tissue. Ice cream is a nutritionally enriched congealed dairy product consumed by all ages especially children during summer (El-Sharef *et al.*, 2006). Yoghurt is the best popular cultured dairy products all over the world. Its consumption is associated with several types of human health benefits, including its effect against development of colon tumors (Wollowski *et al.*, 2001). Milk and dairy products are subjected to spoilage or contamination with pathogens during production, handling, processing and distribution (Fernandes, 2009). Therefore the microbial content of milk and dairy products are a major feature in determining their quality (Queslati *et al.*, 2011). Several routine examinations such as *coliform* count, *enterococcus* count, *Staph.aureus* count and *yeast*s & *mould*s count are generally accepted to test the quality of milk and dairy products. Results of these examinations are used to correct unhygienic production and processing and to serve as a guide to improve the quality of milk and dairy products.

Therefore, this study was planned to throw light on quality condition of milk and some dairy products by applying some chemical and microbiological examinations.

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MATERIALS AND METHODS

1- Collection of samples

A total of one hundred and fifty samples including raw cow's milk, pasteurized milk, small scale ice cream, large scale plain and flavored yoghurt

(30 of each) were collected randomly from dairy shops, super markets and small scale ice cream producers.

The samples were delivered to the laboratory in an insulated ice box and examined at the same day.

2. Determination of acidity % in yoghurt samples was done according to the technique detected by (Ling, 1963).

3. Microbiological examination:

3-1- Preparation of samples (APHA, 1992a).
11 ml/g. of well mixed raw cow's milk, pasteurized milk and yoghurt samples were added to 99 ml of sterile peptone water 0.1% to make a dilution of 1/10 from which 10-fold serial dilutions were made up.

3-2- Preparation of Ice cream samples.
11 g. of well mixed ice cream samples after melting at room temperature (25°C) were added separately to 99 ml of sterile peptone water 0.1% and well mixed to prepare a dilution of 1:10; from which ten –fold serial dilutions were made.

3-3- Total *coliform* count (MPN) using lauryl sulphate tryptose (LST) broth and Brilliant-green Lactose Bile 2% broth (APHA, 1992a).

3-4- *Faecal coliform* count by using EC broth (APHA, 1992a).

3-5- *E. coli* count by using Eosine Methylene Blue agar (EMB) (APHA, 1992a).

3-6- Enumeration and isolation of *enterococci* by using Kanamycin Aesculin Azide agar plates (Mossel *et al.*, 1978).

3-7- Identification of *enterococci* (Facklam and Collins, 1989).

3-8- Enumeration, isolation and identification of *Staph.aureus* by using Baired parker's agar (APHA 1992b).

3-9- Total yeasts and moulds count by using Sabouraud Dextrose agar (APHA, 1985).

RESULTS

Table 1: Statistical analytical results of titratable acidity % in examined yoghurt samples (plain and flavored)

Samples	No. of samples	Min.	Max.	Mean	±SEM
Plain yoghurt	30	1.21	1.59	1.41	0.02
Flavored yoghurt	30	1.32	1.99	1.67	0.04

Table 2: Statistical analytical results of total *coliform* count (cfu/ml or g.) in the examined samples.

Samples	No. of samples	Positive samples		Min.	Max.	Mean	±SEM
		No.	%				
Raw milk	30	30	100	1.5×10^3	9.3×10^6	7.5×10^5	3.9×10^5
Pasteurized milk	30	14	46.67	< 3	1.5×10^4	8.25×10^2	5.04×10^2
Ice-cream (small scale)	30	30	100	2.1×10^2	7.5×10^5	8.2×10^4	4.1×10^4
Plain yoghurt	30	10	33.33	< 3	9.3×10^3	4.83×10^2	3.15×10^2
Flavored yoghurt	30	18	60	< 3	1.5×10^4	2.72×10^3	9.5×10^2

Table 3: Statistical analytical results of *faecal coliform* (cfu/ml or g.) in the examined samples.

Samples	No. of samples	Positive samples		Min.	Max.	Mean	±SEM
		No.	%				
Raw milk	30	28	93.33	< 3	4.3×10^5	2.8×10^4	1.5×10^4
Pasteurized milk	30	10	33.33	< 3	2.1×10^3	1.16×10^2	7.11×10
Ice-cream (small scale)	30	25	83.33	< 3	2.1×10^3	1.02×10^3	1.71×10^2
Plain yoghurt	30	6	20	< 3	2.1×10^2	2.01×10	1.07×10
Flavored yoghurt	30	13	43.33	< 3	2.1×10^3	3.13×10^2	1.30×10^2

Table 4: Statistical analytical results of *E.coli* true faecal type count (cfu/mlor g.) in the examined samples.

Samples	No. of samples	Positive samples		Min.	Max.	Mean	±SEM
		No.	%				
Raw milk	30	25	83.33	< 3	2.1×10^4	1.38×10^3	6.89×10^2
Pasteurized milk	30	7	23.33	< 3	2.1×10^2	1.84×10	9.5
Ice-cream (small scale)	30	24	80	< 3	2.1×10^3	4.87×10^2	1.18×10^2
Plain yoghurt	30	6	20	< 3	2.1×10^2	1.36×10	8.4
Flavored yoghurt	30	12	40	< 3	2.1×10^2	4.68×10	1.50×10

Table 5: Statistical analytical results of *Entercocci* count (cfu/mlorg.) in the examined samples.

Samples	No. of samples	Positive samples		Min.	Max.	Mean	±SEM
		No.	%				
Raw milk	30	30	100	6×10^4	2.5×10^6	1.12×10^6	1.29×10^5
Pasteurized milk	30	15	50	$< 10^2$	6×10^3	2.1×10^3	4.20×10^2
Ice-cream (small scale)	30	25	83.33	$< 10^2$	3×10^6	1.1×10^6	1.87×10^5
Plain yoghurt	30	12	40	$< 10^2$	1×10^4	2.23×10^3	6.29×10^2
Flavored yoghurt	30	15	50	$< 10^2$	2.5×10^4	7.77×10^3	1.67×10^3

Table 6: Incidence of the isolated *Enterococcus* species from the examined samples

The examined samples	No. of the examined samples	*Enterococcus faecalis*		*Enterococcus faecium*		*Enterococcus durans*	
		No.	%	No.	%	No.	%
Raw milk	30	14	46.67	12	40	4	13.33
Pasteurized milk	30	10	33.33	5	16.67	0	0
Ice-cream (small scale)	30	16	53.33	9	30	0	0
Plain yoghurt	30	8	26.67	4	13.33	0	0
Flavored yoghurt	30	10	33.33	5	16.67	0	0
Total	150	58	36.67	35	23.33	4	2.67

Table 7: Statistical analytical results of *staph.aureus* count (cfu/mlorg.) in examined samples

Samples	No. of samples	Positive samples		Min.	Max.	Mean	±SEM
		No.	%				
Raw milk	30	20	66.67	$<10^2$	6×10^5	1.98×10^5	3.91×10^4
Ice-cream (Small scale)	30	10	33.33	$<10^2$	4×10^5	7.65×10^4	2.41×10^4

Table 8: Statistical analytical results of total *yeast*s and *mould*s count (cfu/g.) in the examined yoghurt samples/g

Samples	No. of samples	Positive samples		Min.	Max.	Mean	±SEM
		No.	%				
Plain yoghurt	30	10	33.33	<10	6×10^2	1.15×10^2	3.59×10
Flavored yoghurt	30	18	60	<10	1.2×10^3	4.48×10^2	8.17×10

DISCUSSION

1. Sanitary examination (The titratable acidity % of yoghurt):-

Inspection of Table 1 showed that the titratable acidity % of examined plain yoghurt samples ranged from 1.21 to 1.59 with a mean value of 1.41 ± 0.02. Lower results of titratable acidity % were reported by Abou El-Makarem (2013) while similar results were obtained by El- Kasas (2004) and El-Asuoty (2011). The titratable acidity % of examined flavored yoghurt samples ranged from 1.32 to 1.99 with a mean value of 1.67 ± 0.04 Lower results of titratable acidity % were detected by El- Le boudy *et al.* (2017), while similar results were demonstrated by Küçüköner and Tarakçi (2003), while, higher results were shown by El- Kasas (2004**).**

There is a variation in percentage of titratable acididty may be due to the percentage of the inoculum starter, incubation time and temperature of yoghurt storage (Walstra *et al.*, 1999).

2. Micobiological examination:-

2.1- Total *coliforms*:

It is evident from Table 2 that total *coliforms* were detected in 30(100%), 14(46.67%), 30(100%), 10(33.33%) and 18(60%) of the examined raw cow's milk, pasteurized milk, small scale ice cream and large scale plain and flavored yoghurt samples, respectively with mean values of $7.5\times10^5\pm 3.9\times10^5$, $8.25\times10^2\pm 5.04\times10^2$, $8.2\times10^4\pm 4.1\times10^4$, $4.83\times10^2 \pm 3.15\times10^2$ and $2.72\times10^3\pm 9.5\times10^2$ cfu/ml or g.

Higher results of total *coliforms* in raw cow's milk were reported by El-Zubeir and Ahmed (2007), while lower results were reported by El-Kholy *et al.* (2015). Higher results of total *coliforms* in pasteurized milk were obtained by Stanescu *et al.* (1992), while lower results were noticed by Siva *et al.* (1993). Higher results of total *coliforms* in ice-cream were reported by Çinar (2010), while lower results were revealed by El-Kholy *et al.* (2015).

Lower results of total *coliforms* in plain yoghurt were detected by Moustafa (2004) and Sadik (2009), while higher results were reported by Ibrahim (2008) and Hagger (2011). Higher results of total *coliforms* in flavored yoghurt were reported by El- Kasas (2004), while lower results were obtained by Tarakci (2003).

3- Faecal coliforms:

It is evident from Table 3 that *faecal coliforms* were detected in 28(93.33 %), 10(33.33%), 25(83.33%), 6(20%) and 13(43.33%) of the examined raw cow's milk, pasteurized milk, small scale ice cream and large scale plain and flavored yoghurt samples, respectively with mean values of $2.8\times10^4\pm 1.5\times10^4$, $1.16\times10^2 \pm 7.11\times10$, $1.02\times10^3 \pm 1.71\times10^2$, $2.01\times10\pm 1.07\times10$ and $3.13\times10^2\pm 1.30\times10^2$ cfu /ml or g.

Higher results of *faecal coliforms* in raw cow's milk were reported by Meshref (2013), while lower results were reported by El-Kholy *et al.* (2015).

Higher results of *faecal coliforms* in pasteurized milk were showed by Leyva *et al.* (1992). Higher results of *faecal coliforms* in small scale ice cream were reported by Hassan (2003), while lower results were noticed by Salem (2017) higher results of faecal coliforms in large scale plain yoghurt were demonstrated by Armanios (2013), while lower results were detected by Hassan (2003). Lower results of faecal coliforms in flavored yoghurt were revealed by Hafez (2010).

The presence of coliforms and *faecal coliforms* in milk and its products indicates either unsanitary conditions during production, processing or storage, (APHA, 1992b) or possibility of post-pasteurization contamination (Robinson, 2002).

4- *E.coli* count:

It is evident from Table 4 that *E.coli* true faecal type were detected in 25(83.33%), 7(23.33%), 24(80%), 6(20%) and 12(40%) of the examined raw cow's milk, pasteurized milk, small scale ice cream and large scale plain and flavored yoghurt samples, respectively with mean values of $1.38\times10^3\pm 6.89\times10^2$, $1.84\times10\pm9.5$, $4.87\times10^2\pm1.18\times10^2$, $1.36\times10\pm 8.4$ and $4.68\times10\pm 1.50\times10$ cfu/mlor g.

Higher results of *E.coli* in raw cow's milk were obtained by Mohamed and El Zubeir (2007) while lower results were noticed by Ali *et al.* (2010). Higher results of *E.coli* in pasteurized milk were revealed by Anderson *et al.* (2011), while nearly similar results of *E.coli* in pasteurized milk were detected by Leyva et al. (1992) Higher results of *E.coli* in small scale ice cream were showed by Sobeih *et al.* (2002), while nearly similar results were demonstrated by Hassan (2003), lower results were detected by Salem (2017). Higher results of *E.coli* in plain yoghurt were reported by Zeinhom (2007), while lower results were noticed by Moustafa (2004). Higher results of *E.coli* in flavored yoghurt were obtained by Abd- El Aal (2008)**,** while nearly similar results were revealed by El-Le boudy *et al.* (2017).

E. coli is a good indicator of fecal pollution and its presence in dairy products indicates presence of other enteropathogenic microorganisms which are considered a public health hazard Singh and Prakash (2008).

5- *Enterococci* count:

It is evident from Table (5) that *Enterococci* were detected in 30(100%), 15(50%), 25 (83.33%), 12(40%) and 15(50%) of the examined raw cow's milk, pasteurized milk, small scale ice cream, large scale plain and flavored yoghurt samples, respectively with mean values of $1.12\times10^6\pm 1.29\times10^5$, $2.1\times10^3\pm$

4.20×10^2, $1.1\times10^6\pm1.87\times10^5$, $2.23\times10^3\pm 6.29\times10^2$ and $7.77\times10^3\pm1.67\times10^3$ cfu/m lorg., respectively.

Similar results of *Enterococci* in raw cow's milk were showed by Hussein (2013), while lower results were noticed by Hammad (2015). Lower results of *Enterococci* in pasteurized milk were revealed by Amer *et al.* (2007) and nearly similar results of *Enterococci* in ice cream were reported by El-Bassiony (1985). Lower results of *Enterococci* in ice cream were detected by Nawar (2001) and Hassan (2003). Similar results of *Enterococci* in plain yoghurt were demonstrated by Hassan (2003), while lower results were noticed by Abd El-Aal (2008), while higher results were revealed by Abou El-Makarem (2013). Lower results of *Enterococci* in flavored yoghurt were reported by Abd El-Aal (2008) and El-Leboudy (2017).

It is evident from Table 6 that incidence of *Enterococcus* species isolated from the examined samples: *Enterococcus faecalis* were detected in 14(46.67%), 10(33.33%), 16(53.33%), 8(26.67%) and 10(33.33%), while *Enterococcus faecium* were detected in 12(40%), 5(16.67%), 9(30%), 4(13.33%) and 5(16.67%) of the examined raw cow's milk, pasteurized milk, small scale ice cream, large scale plain yoghurt and flavored yoghurt samples, respectively. *Enterococcus durans* was detected in 4(13.33%) of the examined raw cow's milk samples only.

The existence of *Enterococci* in dairy products is an index of neglected sanitary control measures during production. Moreover, *Enterococci* count is considered more reliable than the *coliforms* count as an indicator of sanitary quality of dairy products as they are able to survive unfavorable microenvironment.

Many foods naturally contain from small to large numbers of *enterococci*, especially *Enterococcus faecalis* and *Enterococcus faecium*, relatively low levels, 10^1to10^3 *enterococci*/g, are common in a wide variety of foods (Hartman *et al.*, 2001). Enterococci are reliable indicators of recontamination in cultured milk products than coliforms which are inhibited by the low pH of the products (Vanos, 1991). *Enterococci* are tolerant to very high temperature, salinity, pH and they are one of the most thermotolerant of non sporulated bacteria, so *enterococci* may survive some types of food processing (Pillar and Gilmore, 2004).

6- *Staph.aureus*:

It is evident from Table 7 *Staph.aureus* was detected in 20 (66.67%) and 10(33.33%) of the examined raw cow's milk and small scale ice cream samples, respectively with mean values of $1.98\times10^5\pm2.15\times10^5$ and $7.65\times10^4\pm 1.32\times10^5$ cfu/mlor g., but was not detected in the other samples.

Higher results of *Staph.aureus* in raw cow's milk were recorded by Mohamed *et al.* (2002) lower results were noticed by Kassem (2011). In addition higher results of *Staph.aureus* in pasteurized milk were reported by El-Sayed (1997) and Vahedi *et al.* (2013). Lower results of *Staph.aureus* in ice cream were showed by Nawar (2001) and Mohamed (2017) while higher data were revealed by Fadel and Ismail (2009). Higher results of *Staph.aureus* in plain yoghurt were detected by Hassan (2003) and Abd El-Aal (2008) while the similar results were noticed by Hafez (2010) and Morsy (2016). Higher results of *Staph.aureus* in flavored yoghurt were showed by Abd El-Aal (2008) while nearly similar data were demonstrated by El-Le boudy *et al.* (2017). *Staph.aureus* in food is an indicator of its contamination from personnel sharing in production and handling.

Milk and its products are involved in food poisoning outbreak from public health point of view; Staph.aureus was the causative agent in many cases of food poisoning and gastroenteritis among consumers (Eley,1996). Staph.aureus growth can occur during manufacturing depending on acid production rapidity. The significance of Staph.aureus presence in our food suspected of causing staphylococcal poisoning should be interpreted with caution. Although foods should contain at least 10^6 enterotoxigenic Staph.aureus cfu/g to induce disease, few numbers of Staph.aureus present in thermally cooked foods may represent the survivors of very large populations (Robinson, 2002).

7- Total yeasts and moulds count:

Inspection on the results present in Table 8 indicated that total yeasts and moulds were detected in 10(33.33%) and 18(60%) of the examined large scale plain and flavored yoghurt samples, respectively with mean values of 1.41 ± 0.11 and 1.67 ± 0.19 cfu/ml or g. Higher results of Total yeasts and moulds count in plain yoghurt were showed by El Kasas (2004) and Morsy (2016), while lower results were noticed by Hafez (2010). Higher data of total yeasts and moulds count in flavored yoghurt were revealed by El-Le boudy *et al.* (2017), while lower results were demonstrated by Pieckova *et al.* (2002).

Foodborne which was caused by moulds and possibly yeasts may be hazardous to human or animal health due to their ability to produce toxic metabolites known as mycotoxins. Which are stable compounds that are not destroyed during food processing or cooking even through the generating organisms may not survive food preparation, the performed toxin may still be present. Some foodborne moulds and yeasts may also cause allergic reactions or may cause infections (Valerie *et al.*, 2001). Contamination of dairy products by Yeasts and moulds come from the air, improperly storage or containers used for packaging the product, causing several defects in dairy products (Robinson, 2002).

CONCLUSION

Inspection of the obtained results indicated that sanitary conditions during manufacturing, handling and distribution of milk and its products are neglected. Most of the examined samples are contaminated with *coliforms, faecal coliforms, E.coli, enterococci, Staph.aureus and yeasts & moulds.*

The presence of these organisms in a high numbers is objectionable as they render the dairy products of inferior quality and unfit for human consumption. As well as the previously mentioned organisms are considered indicator microorganisms as indices for the quality of milk and dairy products. So, to improve the quality of milk and its products to be safe for consumers from exposure to the risk of food infection or intoxication, there are several suggestions should be taken in consideration:

1- Enhancement of proper personal hygiene practices among all workers sharing in production and handling of produced dairy products.
2- Appropriate control measures through periodical inspection of plants and dairies.
3- Good quality, safe and wholesome milk produced under strict hygienic conditions and received a pasteurization treatment should be used in the manufacturing of this product.
4- Using of the refrigeration during processing, storage and handling of the dairy product.
5- Storage of processed milk at lower temperature and avoidance of post-pasteurization contamination are the bases to produce safe pasteurized milk.
6- Carrying out HACCP program is required for the safety production of these products.

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المبينات الميكروبية كمؤشر لجودة اللبن وبعض المنتجات اللبنية

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أجريت هذه الدراسة على ١٥٠ عينة من اللبن البقري الخام واللبن المبستر، الآيس كريم ، الزبادي بنوعيه العادي وذو النكهة (ثلاثون عينة من كل منتج) والتى تم جمعها عشوائيا من محافظة الفيوم وذلك لفحصها ومعرفة مدى سلامتها وأثرها على صحة المستهلك. قد أسفرت الدراسة عن النتائج التالية: ١- متوسط النسبة المئوية للحموضة فى عينات الزبادى العادي و ذو النكهة هي ١،٤١ ± ٠،٠٢و ١،٦٧ ± ٠،٠٤٪ على التوالي. ٢- تواجدت مجموعة البكتيريا القولونية المعوية بمتوسط هو ٧،٥ × ١٠^٥ ± ٣،٩ × ١٠^٥، ٨،٢٥ × ١٠^٢ ± ٥،٠٤ × ١٠^٢، ٨،٢ × ١٠^٤ ± ٤،١ × ١٠^٤، ٤،٨٣ × ١٠^٢ ± ٣،١٥ × ١٠^٢و٢،٧٢ × ١٠^٣ ± ٩،٥ × ١٠^٢ ميكروب لكل مل او جرام فى عينات كل من اللبن البقري الخام ، اللبن المبستر، الأيس كريم ، الزبادي بنوعيه العادي وذو النكهة على التوالي.

٣- تواجدت مجموعة البكتيريا القولونية المعوية البرازية بمتوسط هو ٢،٨ × ١٠^٤ ± ١،٥ × ١٠^٤، ١،١٦ × ١٠^٢ ± ٧،١١ × ١٠، ١،٠٢ × ١٠^٣ ± ١،٧١ × ١٠^٢، ٢،٠١ × ١٠^٢ ± ١،٠٧ × ١٠و١٣،٣ × ١٠^٢ ± ١،٣٠ × ١٠^٢ ميكروب لكل مل او جرام فى عينات كل من اللبن البقري الخام ، اللبن المبستر، الأيس كريم ، الزبادي بنوعيه العادي وذو النكهة على التوالي. ٤- تواجد ميكروب الايشريشيا كولاى بمتوسط هو ١،٣٨ × ١٠^٣ ± ٦،٨٩ × ١٠^٢، ١،٨٤ × ١٠ ± ٩،٥، ٤،٨٧ × ١٠^٢ ± ١،١٨ × ١٠^٢، ١،٣٦ × ١٠ ± ٨،٤ و٤،٦٨ × ١٠ ± ١،٥٠ × ١٠ ميكروب لكل مل او جرام فى عينات كل من اللبن البقري الخام ، اللبن المبستر، الأيس كريم ، الزبادي بنوعيه العادي وذو النكهة على التوالي. ٥- تواجدت الميكروبات السبحية المعوية بمتوسط هو ١،١٢ × ١٠^٦ ± ١،٢٩ × ١٠^٥، ٢،١ × ١٠^٣ ± ٤،٢٠ × ١٠^٢، ١،١ × ١٠^٦ ± ١،٨٧ × ١٠^٥، ٢،٢٣ × ١٠^٣ ± ٦،٢٩ × ١٠^٢و٧،٧٧ × ١٠^٣ ± ١،٦٧ × ١٠^٣ ميكروب لكل مل او جرام فى عينات كل من اللبن البقري الخام ، اللبن المبستر، الأيس كريم ، الزبادي بنوعيه العادي وذو النكهة على التوالي. ٦- لم يتم عزل الميكروب العنقودى الذهبى الا فى عينات اللبن البقري الخام والأيس كريم بمتوسط هو ١،٩٨ × ١٠^٥ ± ٣،٩١ × ١٠^٤و ٧،٦٥ × ١٠^٤ ± ٢،٤١ × ١٠^٤ ميكروب لكل مل او جرام على التوالي. ٧- تواجدت الخمائر والفطريات بمتوسط هو١،١٥ × ١٠^٢ ± ٣،٥٩ × ١٠ و٤،٤٨ × ١٠^٢ ± ٨،١٧ × ١٠ ميكروب لكل جرام فى عينات كل من الزبادي العادي وذو النكهة على التوالي. هذا وقد تم مناقشة الأهمية الصحية والاقتصادية للميكروبات المعزولة وكذلك الاشتراطات الصحية والتوصيات الواجب اتباعها فى انتاج وتداول تلك المنتجات للحصول على منتجات ذات جودة صحية عالية وامنة للمستهلك.