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QUALITY EVALUATION OF SOME DAIRY PRODUCTS

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ABSTRACT

This work was carried out to evaluate the quality of some dairy products in Kafrelsheikh governorate. One hundred samples, fifty each of UHT milk, Kariesh cheese, were collected randomly from small dairies and supermarkets in different localities at Kafrelsheikh Governorate. for UHT milk sensory examination The result reveals that all samples were good fat percent ranged from 2.1%- 4.1% with a mean 3.3% $\pm$ 0.08. Bacteriological examination anaerobic bacterial count the examination reveals that all samples were negative for anerobes. total Psychrotrophic count the examination reveals that all samples were negative for Psychrotrophes. total thermoduric count the incidence was 10 % while the count was ranged from 10- 20 with a mean of 12 $\pm$ 1.99. For Kariesh cheese sensory examination each sample was subjected for sensory examination for flavor, texture, color and appearance.The fat content: which ranged from 2.5% – 4.12 % with a mean of 2.13% $\pm$ 0.053. pH value ranged from 4.12- 4.3 with a mean 4.2 $\pm$ 0.007. Bacteriological examination total anaerobic count the examination reveals that all samples were negative for anerobes. Total coliform count. (MPN / ml) ranged from 9×10^2 to 2.4×10^5 with a mean of $6.23 \times 10^4 \pm 1.1 \times 10^4$ Staphylococcus count was ranged from1.5×10^4 to 28×10^5 with a mean of $8.3 \times 10^5 \pm 1.12 \times 10^5$. : Staph. aureus was detected only in13 samples with 26%.-Out of 50 collected Staphylococcus aureus colony only 27 were coagulase + (54%) and 23 were coagulase negative (46%).

INTRODUCTION

Milk and milk products rank high among other foods and are considered as the most perfect food for human from birth to senility. They are not only having good sensory properties, but also containing all nutrients required for the body which can prevent or reduce risks of many nutritional deficiency diseases. Although salt content in cheese, at which is produced, stored and served, yet various microorganisms may gain access to these products during production, processing and storage, then grow and affect the quality and safety of such products ***(Marth and Steele, 2001 and Marshall et al. 2003)***.

Kareish cheese is made at home from naturally fermented skim milk by lactic acid bacteria. This method may expose the product to contamination with microorganisms discharged from the diseased udder or from unhealthy animal and contaminated environment. These micro-rganisms may be responsible for different diseases including food poisoning or render the product of inferior quality and unfit for human consumption ***(Robinson, 1983).***

Coliforms are routinely used as indicator to a certain the quality of the food products. Their presence indicates careless methods of production, handling of the processed food products and the use of insufficient sanitized equipment. Moreover, Coliforms are used to measure the quality of the practices used to minimize microbial contamination of dairy products and as an approved safety indicator in HACCP system ***(Banwart, 1998).***

Psychrotrophs are ubiquitous; their natural habitats are soil, water, plants and animals. They were implicated in many defects in milk and dairy products which are a problem resulting from prolonged refrigeration storage ***(Swart et al. 1989; Garg, 1990)***. Dairy animals are probably the main source of contamination of raw milk with Staphylococci ***(Vautor et al. 2003).*** In particular, dairy animals with subclinical Staphylococcus mastitis may shed large numbers of Staphylococci into the milk. However, contamination of raw milk and raw milk products from human handling or from the environment during manufacture is also possible. Environmental conditions such as temperature, pH, water activity, salt concentration, and competing micro flora influence Staphylococci growth and enterotoxins production ***(Genigeorgis, 1989).***

The present study was planed to evaluate the quality evaluation of some dairy products (UHT milk, Kareish cheese) collected from Kafrelsheikh markets through the following scheme:

MATERIAL AND METHODS

Collection of samples:

One hundred samples of UHT milk and Kareish cheese (fifty of each) were collected randomly from small dairies and supermarkets in different localities at Kafrelsheikh Governorate. The collected samples were obtained in their containers as sold to the public or in a sterile polyethylene bags and transferred directly to the laboratory, with a minimum of delay, in an ice box where prepared and examined.

UHT milk:

Sensory examination:

The upper part of each package was cleaned with 70% alcohol, leave to dry and opened with sterile scissor. Each sample was examined for appearance, closure, smell and the taste of the content, also recording manufacturing and expire date of each sample.

Sterility test: ***(Robinson, 1981)***

All milk samples were incubated at 55°C for one week then examined for bacterial growth**.**

Preparation of samples:

Each sample was divided into three parts, the first is examined for fat percent, the second is subjected to laboratory pasteurization (63°C ± 0.5°C for 30 min.) before being examined for thermoduric count, and the third examined for total anaerobic and psychrotrophic plate counts

Chemical examination of UHT milk:

determination of fat content according to ***Bradley, et al. (1992).***

Bacteriological examination:

Preparation of serial dilutions: ***(A.P.H.A. ,1992)***

Ten ml of each sample was aspirated with a sterile pipette and added to 90ml sterile distal water and thoroughly mixed to make a dilution of 1:10 from which 10 fold serial dilutions were prepared. Total thermoduric count and Total psychrotrophic count according to ***A.P.H.A. (1992),*** Anaerobic bacterial count according to ***I.C.M.S.F.(1978)*** using Gas pack anaerobic jar with gas generating kit ***(Oxoid, 1992).***

Kareish cheese:

Sensory examination:

Each sample was subjected for sensory examination for flavor, texture, colour and appearance.

Chemical examination:

determination of fat content according to ***A.P.H.A. (1992).***

pH value: *(A.O.A.C., 1990)*

The pH value was determined with the technique recommended by which was carried out by using digital pH meter.

Bacteriological examination:

Preparation of serial dilutions: *(A.P.H.A., 1992)*

The second part of each sample (11 grams) was aseptically transferred in a sterile polyethylene bag containing 99 ml Sodium citrate 2%. The contents were homogenized at 14000 rpm for 2.5 minutes to provide a dilution of 10^{-1}, from which 10 fold serial dilutions were prepared**.**

Total anaerobic count and determination of total coliform count. (MPN / ml) according to ***I.C.M.S.F. (1978),*** Enumeration and isolation of Staphylococcus according to ***Thatcher and Clark (1975).*** Identification of the suspected Staphylococcus aureus ***(Sonnewirth and Jarett, 1980).***

RESULTS

Table (1): Statistical analytical results of fat percent in the examined UHT milk samples.

Test	No. of examined samples	Minimum	Maximum	Mean ± SEM
Fat %	50	2.1	4.1	3.3 ± 0.08

Table (2): Statistical analytical results of the examined UHT milk samples based on Bacteriological examination.

Types of organisms	No. of examined samples	Positive samples		Minimum	Maximum	Mean ± SEM
		No.	%			
Thermoduric count	50	5	10	10	20	12 ± 1.99
Psychrotrophic count	50	0	0	0	0	0
Anaerobic count	50	0	0	0	0	0

Table (3): Statistical analytical results of fat percent and pH value in the examined Kareish cheese samples.

Tests	No. of examined samples	Minimum	Maximum	Mean ± SEM
Fat %	50	1.5	4.12	2.13 ± 0.053
pH value	50	4.12	4.3	4.2 ± 0.007

Table (4): Statistical analytical results of the examined Kareish cheese samples based on Bacteriological examination.

Types of organisms	No. of examined samples	Positive samples		Minimum	Maximum	Mean ± SEM
		No.	%			
Coliform count	50	50	100	9×10^2	2.4×10^5	$6.23 \times 10^4 \pm 1.1 \times 10^4$
Staphylococcus count	50	50	100	1.5×10^4	2.8×10^6	$8.3 \times 10^5 \pm 1.12 \times 10^5$
Anaerobic count	50	0	0	0	0	0

Table (5): Incidence of Staphylococcus aureus in Kareish cheese samples.

Types of samples	No. of examined samples	Positive samples		No. of tested isolates	Coagulase positive isolates	
		No.	%		No.	%
Kareish cheese	50	13	26	50	27	54

DISCUSSION

UHT milk:

Sensory and chemical examination:

The sensory evaluation of UHT milk revealed that all samples under examination were good while the Chemical examination revealed that the fat % in the examined samples varied from 2.1 to 4.1, with a mean value of 3.3 ± 0.08. This result showed that the mean values recorded are compatible with the data recorded on the package (The fat content not less than 3 %). These result was agreed with the ***(Egyptian standard, 2005 a)*** (Table 1). The variability in fat content of UHT may be attributed to long storage either in room temperature or under refrigeration, ***(Deraz, 1997),*** who mentioned a range for fat percent from 2.5 – 4.

Sterility test:

After incubation for 1 week at 55^{o}C, showed that all packages showed no blow up changes which indicates sterile packaging and efficient heat treatment.

Bacteriological examination:

Thermoduric bacteria:

Milk is the most nearly perfect single food due to its high nutritive values; and also it is considered as a good medium for bacterial growth which may gain access during milking, production, processing, packaging and storage. So, different methods are adopted to protect milk from contamination and to keep it fit for consumption like pasteurization, sterilization and ultra heat treatment to prevent public health hazard or induction spoilage to the products ***(Vassavadava and Smith, 1987)***.

The results of the bacteriological examination in table (2), showed that, thermoduric bacteria were detected in 5 out of 50 UHT examined milk samples (10%). This incidence is, to a great extant, less than that recorded by both ***(El-Talawy 1998).*** This result appears to be lower than that recorded by ***El-Asuoty, (2006).***The finding that the total thermoduric count in this experiment was lower than that reported by other researchers could be explained in a way that the producers apply strict hygienic measurements. It could be also that the amount of UHT milk available in the market is small in a manner that it does not necessitate storage for long period or that the distributors used to keep packages of UHT milk in the fridge. ***(Kim, 1979),*** reported that the thermoduric count in UHT milk can be affected by both the temperature of storage and the period of storage.

The presence of thermoduric organisms in UHT milk not only results in significant economic losses due to spoilage of the products and rejection of such products by the consumers, but also they are incriminated in many food poisoning outbreaks ***(Johnson, 1984).*** These microorganisms may gain access to the heat treated milk during processing or as post heat treatment contaminants during packing or storage process ***(I.C.S.M.F., 1978).***

Psychrotrophic microorganisms.

The examination of UHT milk for psychrotrophic microorganisms revealed a negative result. Although one could have expected a positive result for the psychrotrophic count in the UHT milk (Table 2), the negative result obtained in this study agree with ***Clare et al. (2005)*** who reported that, culture from milk under effective ultra heat treatment and a-septic packaging showed negative bacterial growth using various Bacteriological media and the sterility was maintained throughout a one year storage period.

In contrast to the findings of the psychrotrophic examination in the present work, many researchers mentioned varying existence such as ***Saad et al. (1989),*** and ***El–Samragy et al. (1992).*** The presence of psychrotrophs in milk and milk products are not surprising because these organisms are widely distributed in nature ***(Grover et al. 1993).*** Growth of Psychrotrophs is primarily limiting the keeping quality of dairy products held at temperature below 7ºC.resulting in time developmental changes includes, lack of freshness, or a stole taste, off flavours as a result of proteolysis and/or lipolysis produced by thermostable endobacterial enzymes liberated during heat treatment and breaks casein and fat in the milk, ***(Cogan , 1977).***

The public health importance due to Psychrotrophs is evident as Pseudomonal infection can affect the entire gastro intestinal canal causing necrotizing enterocolitis ***(Pererra et al. 1977).*** Also pseudomonas aeruginosa has been implicated in epidemics of moderate to severe diarrhea in children in the form of enteric fever ***(Todar, 2002).***

Anaerobic bacteria:

The food poisoning strains of *Cl. perfringens* belong to type A which causes gas gangrene. The food poisoning strains were heat-resistant and produce only traces of alpha toxin. The food poisoning occurred due to production of an enterotoxin in the intesten. Cl. Perfringens has implicated in cases of food poisoning outbreaks with symptoms of diarrhoea, acute abdominal pain, nausea and occasionally vomiting. These symptoms were firstly noticed from 8 – 12 hours after ingestion of implicated food contained > 10^5 /g of Clostridium perfringens and continued for 6 – 12 hrs ***(Razem and Katusin, 1994).***

The examination of UHT milk for the presence of anaerobes revealed also a negative result for all samples examined (Table 2). The finding of the present experiment could be supported by the report of ***(Alan and Jane, 1994)*** who mentioned that "the safety record of the UHT milk is extremely good and that there have been no published reports of food borne disease associated with its consumption". Also ***(El-Asuoty, 2006)*** failed to detect anaerobes from UHT milk.

Finally this result agree with the ***(Egyptian standard, 2005 a)*** who mentioned that the UHT milk should be free from pathogenic microorganisms.

Kariesh cheese:

Sensory and chemical examination:

The sensory examination of Kariesh cheese revealed that all samples under examination were of good colour, texture and taste. Chemical examination of Kariesh cheese showed that the fat % ranged from 1.5-4.12 % with an average of 2.13±0.053 (Table 3). The low fat percent may be attributed to the method of Kareish cheese manufacture as these cheese made only in Egypt from skim milk. pH value ranged from 4.12 to 4.3 with an average of 4.2±0.007 (Table 3). Approximate values were reported by ***Nawar, (2001) and Amer, (2002).***

Little increase in the Kareish cheese pH than that recorded in the present work were recorded by ***Ibrahim and Sobeih, (2006)*** and ***Nawar, (2007)*** .These relatively high pH values may be attributed to the method of Kareish cheese manufacture in which skim milk is kept for a bout 36 hrs at room temp. thus giving chance for lactics or other bacteria to grow and produce acid.

Bacteriological examination:

Coliform count:

The presence of coliform bacilli indicates evidence of contamination especially of fecal nature ***(Collins et al. 1995).*** Between 1973-1992, a thirty two cheese associated disease outbreaks were recorded in the U.S.A with 1700 cases and 58 deaths ***(Jay, 2000).***The results given in table (4) revealed that all the 50 sample of examined Kareish cheese were positive for coliforms. The coliform count ranged from 9×10^2 - 2.4×10^6 Cfu/gm, with an average of $6.23 \times 10^4 + 1.1 \times 10^4$ Cfu /gm.

Higher coliform counts were reported by ***Kaldes, (1997).*** While lower values for coliform counts were recorded by ***Al- Tahiri, (2005).*** The obtained results in this experiment disagree with the Egyptian standard of Kareish cheese which states that the product should not contain more than 10 microorganisms/g ***(Egyptian Standard, 2005 b).***

Coliforms are very important group of thermoduric Psychrotrophs found in gastrointestinal tract of animal and human beings. The presence of these microorganisms indicates fecal contamination of dairy products. The public health importance of E. coli has been emphasized by many authors and implicated in human cases of gastroenteritis, epidemic diarrhea in infants, summer diarrhea in children as well as cases of food poisoning ***(Fantasia et al. 1975).***

Staphylococcus count:

It is evident from table (4) that the staphylococcus microorganism was detected in 100 % of the examined samples with a count ranged from 1.5×10^5 to 2.8×10^6 cfu /g with an average of $8.3 \times 10^5 \pm 1.12 \times 10^5$ cfu /g. This result nearly agrees with that reported by ***Tawfik et al.***

(1989). Staphylococcus aureus was detected in 26% of the examined samples. A nearly similar finding was reported by ***Ahmed at al. (1988).*** whereas, a higher incidence was reported by ***Amer, et al. (1986c).*** A higher incidence of Staphylococcus aureus was also reported in other soft cheese. ***Sabreen (1996)*** reported an incidence of Staphylococcus aureus of 49 % in Damietta cheese.

The high incidence may be attributed to either that the produced Kariesh cheese by farmer is not heat treated, or that there is no starter added to the cheese which lowers the pH before manufacturing ***(Al-Tahiri, 2005)*** as well as contamination from different sources. The results obtained in this experiment disagree with the Egyptian standard of Kareish cheese which states that the product should be free from pathogenic microorganisms ***(Egyptian Standard, 2005 b).***

Fifty Staphylococcus aureus isolates were collected from the positive samples, 27 were positive 54 % and a 23 were negative 46 % for the coagulase test, this indicates that either coagulase positive or negative are present in the same samples (Table 5). Any type of produced food with low number of staphylococcus will remain free of enterotoxins if it is kept either below 40º F or above 140º F until it is consumed ***(Bryan, 1974)*** which summarized the factors that contributes to the outbreaks in inadequate refrigeration, poor personal hygiene, inadequate processing and availability of bacterial growth environment.

It is noticed that the count of staphylococcus aureus was stressed by many workers due to the believe that the coagulase positive staphylococcus aureus is the only serotype capable of producing enterotoxins and in turn food intoxication but the reason why the present work estimated the total staphylococcus count and not the staphylococcus aureus count was that

the genus staphylococcus includes 31 Spp. of which 18 Spp. are of potential interest in food. Therefore, the present work counted the total staphylococcus and only detected the positive sample of staphylococcus aureus using the criteria described by ***(Harrigan, 1998).*** The suspected staphylococcus aureus samples were subjected to further identification.

The main sources of contamination with staphylococcus are humans (handlers contaminate food via manual contact or via the respiratory tract by coughing and sneezing), and after heat treatment of the food. Nevertheless, in foods such as raw meat, sausages, raw milk, and raw milk cheese, contaminations from animal origins are more frequent due to animal carriage or infections (e.g., mastitis) ***(Le Loir et al. 2003)***.

Detection of anaerobes:

It is evident from the findings achieved in table (4). that the anaerobic bacteria could not be detected from examined samples of Kareish cheese. The most prevalent anaerobes in Kareish cheese are clostridia which are reported by many researchers and with different high percents, ***Ewina, (2001),*** while ***Turantas, et al. (1989)*** failed to detect C. perfringens in examined Turkish white cheeses.

This result agrees with the Egyptian standard for Kareish cheese which states that the product should be free from pathogenic microorganisms ***(Egyptian Standard, 2005 b).*** Clostridial organisms are widely distributed in nature, soil, water in body wastes and being present in the gut of man and animals, therefore they are considered as index of fecal contamination of milk and dairy products ***(Gudkov and Dolidze, 1975)***.

Many outbreaks of food borne illnesses due to Clostridia were reported in the United States, especially outbreaks since December 1981, as FDA has investigated 10 outbreaks in 5 states. The common form of Cl. perfringens poisoning is characterized by intense abdominal cramps and diarrhea which begin 8-22 hours after consumption of foods containing large numbers of C. perfringens bacteria. The illness is usually over within 24 hours but less severe symptoms may persist in some individuals for 1 or 2 weeks. A few deaths have been reported as a result of dehydration and other complications ***(Rhodehamel and Harmon, 1998).***

REFERENCES

- ***A.O.A.C (1990):*** Official Methods of Analysis. 15th Ed., Vol. 2 Food Composition, Additives, Contaminations, Published by the AOAC Inc. Suite 40-2200 Wilson Boulevand, Arlingtm, Virgina 2220/USA.
- ***A.P.H.A., American Public Health Association (1992):*** Standard methods for examination of Diary products. INC, 16th Ed., New York. USA.
- ***Ahmed, A.H. Ahmed; M.K Moustafa; Nagah M. Saad and S.H. Ahmed (1988):*** occurrence of staphylococci in milk and some milk products. Assiut Vet. Med. J. 19 (38): 86-89.
- ***Alan, H.V. and Jane, J. S. (1994):*** In Milk and Milk products Pp 91-92. Chapman&Hall
- ***Al-Tahiri, R. (2005):*** A comparison on microbial condition between traditional dairy products sold in Karak and same products produced by modern dairies. Pak. J. of Nutrition 4(5): 345-348.

- ***Amer, A. A. (2002):*** Safety and quality of butter and cheese through mycological criteria. Ph.D. Thesis. Fac. Vet. Med., Alex. Univ.
- ***Amer, I.H.; Shelaih, M.A. and Elsayed, M.S. (1986 c):*** Staphylococci in milk and some dairy products. Assiut Vet. Med. J., 17: (34): 139-142.
- ***Banwart, G. J. (1998):*** Basic Food Microbiology. 2nd Ed. CBS Publishers and Distributors. New Delhi 11002. (India).
- ***Bradley, R.L.; Arnold, F. Jr.; Barbona, D.M. Jr, Semerad, R.G.; Smith, D.E. and Vines, B.K. (1992):*** Chemical and physical methods: in Standard methods for examination of Diary products. 16th Ed., Marschall, R.T.P. (ed). 433. American Public Health Association (APHA). New York. USA.
- ***Bryan, F.L (1974):*** Bacteriological food hazards today- based on epidemiological information. Food Technol. 28(9) 52-59.
- ***Clare, D. A. Bang, W. S. Cartwright, G. Drake, M. A. Coronel P. and Simunovic J. (2005):*** Comparison of Sensory, Bacteriological, and Biochemical Parameters of Microwave Versus Indirect UHT Fluid Skim Milk During Storage. J. Dairy Sci. 88:4172-4182.
- ***Cogan, T.M. (1977):*** Heat resistant lipases and proteinases and the quality of dairy products. Ann. Bull. Int. Dairy Fed. Document, 118: 26-32.
- ***Collins, C.H.; Lyne , P.M. and Grange J.M.(1995):*** Bacteriological Methods 7th Ed., Butterworth – Heinemann Ltd.
- ***Deraz M.F.S. (1997):*** Physical and chemical changes of packaged UHT milk. M.V.Sc. Thesis. Fac. Agric. Ain Shams Univ., Egypt.

- ***Egyptian Organization for Standardization and Quality (2005 a):*** UHT milk. E.S. 1623/2005.
- ***Egyptian Organization for Standardization and Quality (2005 b):*** Kareish cheese. E.S. 1008-4/2005.
- ***El-Asuoty, M. M. (2006):*** Quality evaluation procedures of Ultra heat treated milk at local markets. M.V.Sc. Thesis, Fac. Vet. Med., Alex. Univ.
- ***El-Samragy Y.A.; El-Nockrashy, S.A.; Effat, B.A. and Magdoub, M.N.I. (1992):*** Proteolytic psychrotrophic bacteria in some dairy products in Egypt. Nahrung, 36 (2): 181-189. diary Sci. Abst., 57 (1) (1995).
- ***El-Talawy, F. M. (1998):*** Studies on thermoduric organisms in raw and heat treated milks. M.V.Sc. Thesis, Fac. Vet. Med. Moshtohor, Zagazig Univ., Banha Branch.
- ***Ewina, M.A. (2001):*** Spore formers in some dairy products in local markets. Ph.D. Thesis. Fac. Vet. Med., Alex. Univ.
- ***Garg, S. K. (1990):*** Psychrotrophs in milk: A review. Ind. J. Dairy Sci., 43, (3): 433-440.
- ***Genigeorgis, C. A. (1989):*** Present state of knowledge on staphylococcal intoxication. Int. J. Food Microbiol. 9:327–360.
- ***Grover, S.; Batish, V.K. and Srivinasan, R.A. (1993):*** Growth proteolytic and enterotoxic activities of Pseudomonas aeruginosa CTM-3 in milk, ice cream and butter. Archiv Für Lebensmittelhygiene, 44(5): 115-117.

- ***Harrigan, W.F (1998):*** Laboratory Methods In Food Microbiology. 3rd Ed. Academic press
- ***I.C.M.S.F. (1978):*** Microorganisms in Food. Their Signification and Methods of Enumeration. 3rd Ed., University of Toronto. Toronto Press, Toronto, Buffalo and London.
- ***Ibrahim, M.A. Ekbal and Sobeih, M. Azza (2006):*** Diarrhoegenic E.coli in kareish cheese manufactures by different methods with special reference to E.coli O157:H7.Minufiya Vet. Med. J. 4(1):169-178.
- ***Johnson, K. M. (1984):*** Bacillus cereus food borne illness. An update. J. Food Prot., 47, (2): 145-153.
- ***Kaldes, Y.Th. (1997):*** Bacteriological examination of soft cheeses manufactured in Minia city. Assiut Vet. Med. J., 38(75): 39-47.
- ***Kim, J.W.(1979):*** Studies on the keeping quality of high temperature pasteurized market milk. Research Report of Agriculture Science and Techniology, 6 (2): 158- 165. Dairy, Sci. Abst., 44 (7): 4850 (1982).
- ***Le Loir Y.; Baron. F. and Gautier M. (2003):*** Staphylococcus aureus and food poisoning. Genet. Mol. Res. 2, (1): 63-76.
- ***Marshall, T.A.; Levy, S.M.; Broffit, B.; Warren, J.J.; Eichenberger-Gilmore, J.M.; Burns, T.L. and Stumbo, P.J. (2003):*** Dental cans and beverage consumption in young children.Pediatrics,112, (3Ptl): el84-191.
- ***Marth, E.H. and Steele, J.J. (2001):*** Applied Dairy Microbiology. 2nd Ed. Dekker, Am, Inc., USA.

- ***Nawar, Dalia, M.M. (2001):*** Hygienic quality of some street-vended dairy products. M.V.Sc. Thesis, Fac. Vet. Med., Alex. Univ.
- ***Nawar, Dalia, M.M. (2007):*** Toxicoinfection organisms in milk and some street-vended dairy products. Ph.D. Thesis, Fac. Vet. Med., Alex. Univ.
- ***Oxoid manual (1992):*** Culture media, ingredients and other laboratory services 7th Ed. Published by Oxoid limited London.
- ***Pererra, P.P.; Mathan, S.M.; Bhat, P. and Baker, J. (1977):*** Aetiology of acute gastroenteritis in infancy and early childhood in southern India. Arch. Dis. Child., 52(6): 482.
- ***Razem, D. and Katusin-Razem, B. (1994):*** The incidence and costs of food borne diseases in Costa Rica. J. Food Prot. (USA), 57(8): 746-751.
- ***Robinson,R.K.(1981):*** Dairy Microbiology. Vol. (2) Applied Sci. pup. London.
- ***Robinson, R. K. (1983):*** Dairy Microbiology. 1ST Ed. Elsevier sci., Publ.co.
- ***Saad, Nagah, M.; El-Bassiony, T.A.; Ahmed, A.A-H. and Moustafa, M.K. (1989):*** Bacteriological quality of Egyptian UHT milk. Assiut Vet. Med. J., 21(42): 36-69.
- ***Sabreen, M.S. (1996):*** Incidence of staphylococci microorganisms in Damietta cheese and the effect of Nigella sativa on the growth of Staphylococcus aureus. 7th Scientific Congress. Fac. Vet. Med. Assiut Univ.

- ***Sonnewirth, A.C. and Jarett, L. (1980):*** Gradwohl's Clinical Laboratory Methods and Diagnosis. Vol. II, 8th Ed., The C.V. Mosby Co. St. Louis, Toronto, London, 2980.

- ***Swart, G. J., Jooste, P. J. and Mostert, J. F. (1989):*** The occurrence and seasonal distribution of psychrotrophic and certain mesophilic bacterial types in the bulk milk supply of the Pretoria area. Suid-Afrikaanse. Tydskrif Vir Suiwelkunde, 21 (1): 1-8, Dairy Science Abstract, 51, (12): 6441 (1989).

- ***Tawfek N.F., Sharaf, O.M., Hewedy, M.M. (1989):*** Incidance of several pathogens and staphylococcal enterotoxins in Kareish cheese. Offentl Gesundheitswes. Jan; 51(1): 27-29.

- ***Thatcher, F.S. and Clark, D.S. (1975):*** Microorganisms in Food. International Committee on Bacteriological specification for foods. Univ. Toronto Press, Toronto and Buffalo, Canada.

- ***Todar, K. (2002):*** Pseudomonas aeruginosa. In: Todar's Online Textbook of Bacteriology.

- ***Vassavada, P.C and Smith, D.E.(1987):*** Health related aspects of milk and milk products. J. Dairy Sci., 70 (2); 382.

- ***Vautor, E., G. Abadie, J. M. Guibert, C. Huard, and M. Pepin. (2003):*** Genotyping of Staphylococcus aureus isolated from various sites on farms with dairy sheep using pulsed-field gel electrophoresis. Vet. Microbiol. 96:69–79.