

MICROBIOLOGICAL EVALUATION OF DOMIATE CHEESE IN MANSOURA CITY

Ibrahim, M. Aman*; Maha, A. M. Al-Ashmawy**;
Ahmed, A. El-Gamal*** and Arwa, H. M. Nassar***

*Food Control Dept., Faculty of vet. Med., Kafr El-Sheikh University

**Food Control Dept., Faculty of vet. Med., Mansoura University

***Animal Health Research Institute- Mansoura

ABSTRACT

A total of one hundred random samples, of Domiate cheese (white soft cheese) were collected from different localities in Mansoura city, El-Dakhalla Governorate to be examined for the incidence of total aerobic count, Coliforms, True faecal type *E.coli*, *Staph. aureus* and total mould and yeast count.

The obtained results revealed that the mean value was 1.9×10^6 - 1.6×10^5 - 1.5×10^4 .

7.2×10^4 and 4.6×10^4 of the examined samples, respectively. While their incidence were 100, 69, 45, 64 and 88% of the collected samples, respectively. Grading examined Domiate cheese according to Egyptian standard for total coliforms count, True faecal type *E.coli*, *Staph. aureus* and total mould and yeast count found the percent of acceptable samples were 54%, 55%, 36% and 22% from the total examined samples, respectively, while unacceptable sample were 46, 45, 64 and 88% of examined samples, respectively. Grading of examined Domiate cheese according to UK Microbiological standard were 59%, 97%, 79% of samples are satisfactory for total *Staph. aureus*, *E.coli* and coliforms count respectively, while 41%, 3% and 21% of samples are unsatisfactory, respectively.

The public health significance and economic importance of isolated organisms as well as recommendation for prevention and minimizing the microbial contamination of Domiate cheese were also discussed.

INTRODUCTION

Cheese was originally developed as a mean of preserving raw milk in time of excess production and generally considered to be relatively safe food, cheese contains high quality proteins, vital minerals and vitamins. However, the spread of some diseases by cheese

have been demonstrated. Whilst pathogens can gain access to cheese from raw milk and post processing. It is clear that many food borne pathogens are faecal in origin.

The higher total bacterial count in white soft cheese samples were occurred due to

several factors as post pasteurization contamination, usually through contact with equipment surfaces or from the air and biofilms residing on surfaces (Austin and Bergeron, 1995).

The presence of large number of coliform in cheese is highly undesirable because it was impossible to eliminate from food. The presence of True faecal type E.coli in cheese samples is an indication of fecal contamination. Moreover, these organisms can grow in cheese especially in hot climatic conditions resulting in undesirable changes in the product besides they constitute a public health hazard.

Staphylococcal food poisoning is being reported with increasing frequency especially in developing countries where food hygiene is still underway (Anne- Galle et al. 2005).

Yeast and mould count in cheese are used as index of proper sanitation quality. Defects in these unripened soft cheeses as rancidity, softness and color defects arise mainly from contamination by yeast and mould.

MATERIALS AND METHODS

One hundred random samples of soft cheese (Domlate cheese) were collected from different markets and dairy shops in Mansoura city EL-Dakhliya Province. Each sample was represented by about 100-150 grams of cheese which was appeared in normal characteristics properties (flavor, aroma, appearance and texture). The collected samples were transferred to the laboratory in clean, dry, sterile and tightly closed wide mouth Jars, with a minimum of delay, where they were prepared for microbiological examination.

Bacteriological examination:

- (A) Preparation of serial dilutions (APHA, 1992).
- (B) Aerobic plate count (Harrigan, 1998).
- (C) Most probable Number of Coliforms (Harrigan, 1998).
- (D) Count of True faecal type E.coli by multiple tube technique (Harrigan, 1998).
- (E) Staphylococcus aureus count (Harrigan, 1998).
- (F) Total Yeast and mould count (Roberts et al., 1995).

RESULTS AND DISCUSSION

The results given in Table (1) revealed that the total aerobic count of examined cheese samples ranged from 1×10^3 to 6.3×10^7 with a mean value of $1.9 \times 10^6 \pm 0.68 \times 10^6$.

Inspection of Table (1) Fig. (1) indicate that the incidence of aerobic bacteria were 100%. The highest frequency distribution lay with in the range of 10^4 - 10^6 (67%). Table (2) fig. (2).

Total aerobic mesophilic count is a prime consideration in examination of food and gives a numerical figure that helping in assessing the general hygienic quality of the product. It reflects the sanitary measures adopted during production, handling and storage (ICMSF, 1986).

The coliform count (MPN/g) ranged from 0.9×10 to 1.4×10^7 with a mean value of $1.6 \times 10^5 \pm 1.4 \times 10^5$. According to results presented in Table (1) and Fig. (1) 69% of examined cheese samples were contaminated by coliform bacteria. The highest frequency

distribution were (48%) lay with in the rang of $10^2 - 10^4$ Table (2) Fig. (2).

Coliform counts are traditional indteator of possible faecal contamination, microbial quality and reflect the hygienic standards adopted in the dairy processing (Ozdemir et al. 1998). A lake of good sanitary practices may result in a loss of quality, spollage or in some cases create a health hazard.

The statistical analytical results reported in Table (1) revealed that True faecal type E.coli count in examined samples ranged from 0.4×10^2 to 1.5×10^6 CFU\g with a mean value of $1.5 \times 10^4 \pm 1.4 \times 10^4$ CFU\g .

The highest frequency distribution (25%) lay with in the rang of $10^2 - 10^4$ Table (2) Fig. (2). The results given in Table (1) and Fig. (1) showed that true fecal type E.coli was isolated from 45% of examined Domlate cheese samples .

Escherichia coli was one of the most important food - borne pathogens that are widely distributed throughout the environment. They have been associated with sever food poisoning outbreaks (Condera et al. 2004) .

The count of Staph aureus was found to be ranged from 1×10^2 to 3.6×10^6 with a mean value of $7.2 \times 10^4 \pm 3.8 \times 10^4$ Table (1) .

According to the results represented in Table (1). Fig (1) 64% of examined Domiate cheese samples were contaminated by Staph. aureus. The highest frequency distribution (40%) lay within the range of $10^4 - 10^6$ Table (2) Fig. (2). Moreover, Staphylococcus aureus

have been found in various type of cheese and Involved in outbreaks of food poisoning (De Reu et al. , 2002).

The statistical analytieal results reported in Table (1) revealed that total mould and yeast count in examined samples ranged from 1×10^2 to 8.3×10^5 CFU\g with a mean value of $4.6 \times 10^4 \pm 1.1 \times 10^4$ CFU\g .

The highest frequency distribution 51% lay within the rang of $10^2 - 10^4$ Table (2) Fig. (2) Results given in Table (1) indicate that 88% of examined cheese samples were contaminated with mould and yeast.

The results obtained indicated that the Domlate cheese in Mansoura City was manufactured and handled under neglected sanitary measures. Therefore strict hygienic measures should be adopted during production of such valuable product .

Grading of the examined Domlate cheese according to the Egyptian Standard (2005) :

The data illustrated in Table (3) explained that grading of cheese according to total coliform count were as follow 54% met the acceptable levels and 46% unacceptable

Grading of examined samples according to True faecal type E.coli indicated that most of the samples 55% were acceptable levels but 45% of samples were unacceptable .

Grading of examined samples according to Staph. aureus count showed that 64% of samples were unacceptable and 36% were acceptable .

Grading according to total mould and yeast count found that 22% met the acceptable limit and 88% of the examined Domlate cheese samples unacceptable .

Grading of examined Domlate cheese samples according to UK. Microbiological Guidelines (Roberts et al., 1995) :

By comparing the bacterial count of the examined Domlate cheese samples with UK. Microbiological Guidelines found that 59% & 97% of samples were satisfactory for Staph. aureus & True faecal type E.coli count respectively, Table (4). Furthermore 41% & 3% of examined samples are unsatisfactory for Staph. aureus & True faecal type E.coli count, respectively. While incase of total coliform 79% of samples were satisfactory but 21% of samples were unsatisfactory .

Fortunately, absence of Staph .aureus or True faecal type E.coli indicating either good sanitation or that these bacteria is not a good competitor with other bacteria present, also presence of E.coli in cheese is objectional not only, it renders cheese unfit for human consumption but also, its presence is a reliable index of faecal contamination, It can enter cheese by many ways as milk, contaminated utensils, water, flies and handling.

Domlate cheese is an excellent medium for the growth of microorganism due to its compositional and high nutritive value, it is an important dairy product and an integral part of a healthful diet due to its substantial contribution to human health so that presence of pathogens in cheese is objectional and lead to potential health hazards to food safety and human health .

Figure (1) . Incidence of isolated micro-organisms from Domiate cheese samples

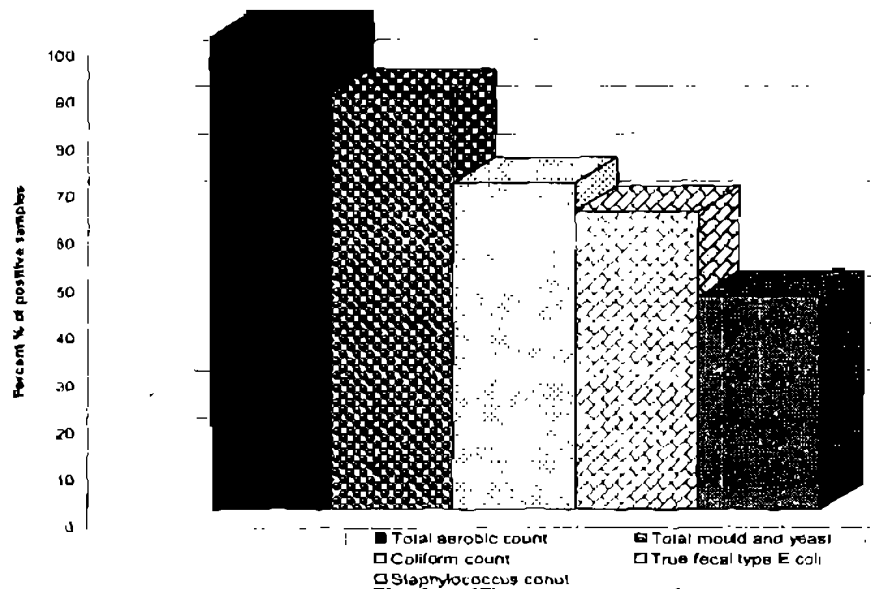


Table (1): Statistical analytical results of Microbial count of examined Domiate cheese samples.

Microbial Count	No. of examined samples	No. of positive samples	Min.	Max.	Mean	±S.E.M.
Total aerobic count	100	100	1×10^3	6.3×10^7	1.9×10^6	0.68×10^6
Coliform count	100	69	0.9×10	1.4×10^7	1.6×10^5	1.4×10^5
True fecal type <i>E.coli</i>	100	45	0.4×10	1.5×10^6	1.5×10^4	1.4×10^4
<i>Staphylococcus aureus</i> count	100	64	1×10^2	3.6×10^6	7.2×10^4	3.8×10^4
Mould and yeast count	100	88	1×10^2	8.3×10^5	4.6×10^4	1.1×10^4

Table (2): Frequency distribution of examined Domiate cheese samples based on their bacterial count .

Interval	No. of positive samples				
	Total colony count	coliform count	True faecal type E.coli	Staph. aureus	mould and yeast count
$10^0 - < 10^2$	-	23	17	-	-
$10^2 - < 10^4$	2	25	25	23	51
$10^4 - < 10^6$	67	19	2	40	37
$10^6 - \leq 10^9$	31	2	1	1	-
Total	100	69	45	64	88

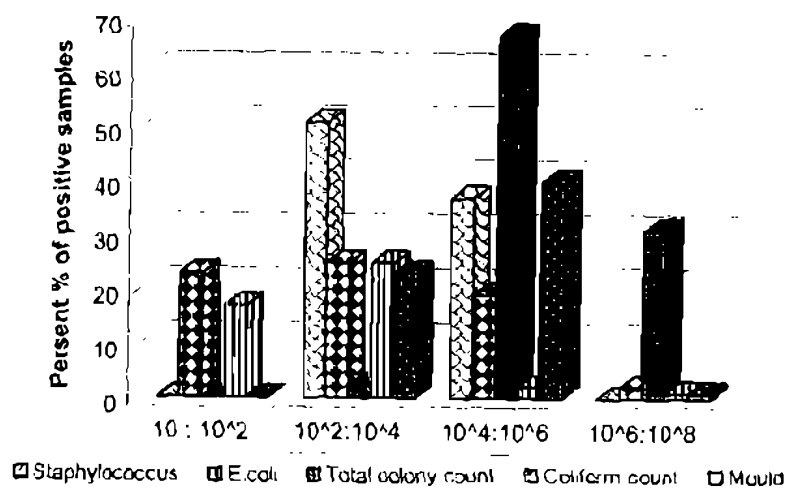
Table (3) : The bacterial results of Domiate cheese samples as compared with Egyptian standards (2005).

Test	No. of examined samples	Acceptable (covering negative results)		Unacceptable	
		< 10		> 10	
Total coliform count	100	No.	%	No.	%
		54	54	46	46
		Free from <i>E. coli</i>		Presence of <i>E. coli</i>	
Total <i>E. coli</i> count	100	No.	%	No.	%
		55	55	45	45
		Free from <i>Staph. aureus</i>		Presence of <i>Staph. aureus</i>	
Total <i>Staph. aureus</i>	100	No.	%	No.	%
		36	36	64	64
		Mould <10 yeast <4x10 ²		Mould >10 yeast >4x10 ²	
Total Mould and Yeast count	100	No.	%	No.	%
		22	22	88	88

Table (4): Grading of examined Domiate cheese samples according to UK Microbiological Guidelines (Roberts et al., 1995).

Test	No. of examined samples	Satisfactory		Unsatisfactory	
Total <i>Staph. aureus</i>	100	< 10 ³		> 10 ⁴	
		No.	%	No.	%
		59	59	41	41
Total <i>E.coli</i> count	100	> 10 ⁴		> 10 ⁵	
		No.	%	No.	%
		97	97	3	3
Total coliform	100	< 10 ⁴		> 10 ⁵	
		No.	%	No.	%
		79	79	21	21

Figure (2) Microbial contamination of the examined Domiate cheese



REFERENCES

American Public Health Association (APHA), (1992) : Compendium of methods for the microbiological examination of food 3rd ed., Vander Zant, C. and Splittstoesser, D.F. (eds) . Washington, D.C.

Anne-Galle, L.; Katnana, S.; Joel Dore, P.; Francois, C. and Tholozan, J. (2005): Development and validation of PCR primers to assess the diversity of Staphylococci in cheese by Temporal temperature Gradient Gel Electrophoresis. Applied Environ. Microbiol J., 71 (1) : 29-38 .

Austin, J. W. and Bergeron, C. (1995) : Development of bacterial biofilms in dairy processing lines. J. of Dairy Res., 62: 509 - 519.

Condera, G.; Dalvit, P.; Martini, M.; Galero, G.; Garmaglia, M.; Goffredo, E.; Loffredo, G.; Morabito, S.; Semproni, P.; Ottavini, D.; Paterlini, F.; Pezzetti, G.; Pisanu, M. and Caprioli, A. (2004) : Verocytotoxin-producing *Escherichia coli* O157 : H7 in minced beef and dairy products in Italy . Int. J. of food Microbiol. 96:67-73.

De Reu, K.; Debeuckelaere, W.; Bottel-

doorn, N.; De Block, J. and Herman, L. (2002) : Hygienic parameters, toxins and pathogens occurrence in raw milk cheeses. J. Food safety, PP. 22.

EGSQ, Egyptian standards for soft cheese - Domiate cheese (2005) : part 3 Es. 1008 - 3\ 2005.

Harrigan, W. F. (1998) : Laboratory methods in food microbiology, 3rd ed. Academic press, San Diego, London, Boston, New York, Sydney, Tokyo, Toronto.

ICMSF, (1986) : International Commission on Microbiological Specification Microbiology of Food and sampling for microbiological analysis principals and specific applications . 2 Ed. Academic Press, New York, London .

Ozdemir, S.; Celik, C. and Sert, M. (1998) : The microbiological and chemical properties of Orgu cheese produced in Karacadag region of Diyarbakir, Turkey . International productivity center publ. No. 66 .

Roberts, D.; Hooper, W. and Greenwood, M. (1995) : Practical food microbiology. Public Health Laboratory Service. London 2nd Edition.

الملخص العربي

التقييم الميكروبيولوجي للجبين الدمياطى فى مدينة المنصورة

د / إبراهيم محمد أمان* د / مها عبده العشماوى**
د / أحمد عبدالجواد الجمل*** د / أروى حسن نصار***

قسم الرقابة الصحية على الأغذية - كلية الطب البيطرى - جامعة كفر الشيخ

قسم الرقابة الصحية على الأغذية - كلية الطب البيطرى - جامعة المنصورة

معمل بحوث صحة الحيوان - المنصورة

أجريت الدراسة على مائة عينة من الجبين الدمياطى جمعت من أماكن متفرقة من مدينة المنصورة، وقد تم فحص العينات ميكروبيولوجيا لمعرفة العدد الكلى للمستعمرات البكتيرية، العدد الكلى لميكروبات الكوليفورم، العدد الكلى لميكروب الاشيريشيا، والعدد الكلى لميكروب المكور العنقود الذهبى وكذا العدد الكلى للفطريات والخمائر، وقد أوضحت النتائج أن متوسط العد الميكروبى فى الجبين الدمياطى $1.9 \times 10^6 - 6.1 \times 10^6 - 4.7 \times 10^6$ على التوالى.

وبمقارنة نتائج العد الكلى لميكروبات الكوليفورم، العدد الكلى لميكروب الاشيريشيا وميكروب العنقود المكور الذهبى وكذا العدد الكلى للفطريات والخمائر بالمواصفات المصرية القياسية لعام ٢٠٠٥ وجد أن $54 - 55 - 36 - 22\%$ من العينات مقبولة وصالحة للاستهلاك الأدمى على التوالى بينما نسب العينات الغير مقبولة كانت $46 - 45 - 64 - 88\%$ على التوالى من إجمالى العينات التى تم فحصها.

وعلى الجانب الآخر تم مقارنة النتائج بالمواصفات القياسية الأوربية وجد أن $59 - 97 - 79\%$ من العينات غير مرضية بالنسبة إلى العدد الكلى لميكروب المكور العنقود الذهبى والعدد الكلى لميكروب الاشيريشيا وميكروبات الكوليفورم على التوالى.

هذا وقد تم مناقشة الأهمية الصحية للميكروبات المعزولة وكذلك اقتراح التوصيات اللازمة لمنع أو تقليل التلوث الميكروبى للجبين الدمياطى إلى أدنى مستوى له لضمان أقصى درجات الأمان الصحى للمستهلكين وأطول عمر تخزينى للجبين الدمياطى.