Animal Health Research Institute,
El-Minia Laboratory,
Head of Provincial Veterinary Laboratory at Minia.

MICROBIOLOGICAL EXAMINATION OF SOFT CHEESES MANUFACTURED IN MINIA CITY

(With 2 Tables)

By

Y. TH. KALDES

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الفحص الميكروبيولوجى للجبن الطرى المصنع فى مدينة المنيا

يعقوب ثابت قلدس

تم جمع عدد ستون عينه عشوائية من الجبن الطرى (عشرون عينه من كل من الجبن الدمياطى والقريش الطازج والمملح) من أسواق مدينه المنيا . أظهرت نتائج العد الميكروبيولوجى أن متوسط العد الكلى – القولونى – العنقودى الذهبى – المكور المعوى والخمائر والفطريات كان فى الجبن القريش الطازج ٢,٩×١٠ ^٨ ± ٠,٦ × ١٠ ^٨ ، ٠,٥٢× ١٠ ^٧ ± ١,٩ × ١٠ ^٧ ، ٨,٩×١٠ ^٧ ± ٥,٩ × ١٠ ^٧ ، ٧,٢ × ١٠ ^٧ ± ١,١ × ١٠ ^٧ ، ٢,٤ × ١٠ ^٧ ± ٠ × ١٠ ^٧ . وفى الجبن القريش المملح ١,٢ × ١٠ ^٤ ± ١,١ × ١٠ ^٤ ، ٣,٤ × ١٠ ^٢ ± ١,٦ × ١٠ ^٢ ، ٧,٨ × ١٠ ± ٠,٨ × ١٠ ، ٨,١ × ١٠ ^٣ ± ٢,٥ × ١٠ ^٢ ، ٤,٢ × ١٠ ^٢ ± ١,٣ × ١٠ ^٢ بينما فى الجبن الدمياطى ١,٧ × ١٠ ^٦ ± ١٠ ^٣ ، ٢,٦ × ١٠ ^٥ ± ١,٢ × ١٠ ^٤ ، ٦,٣ × ١٠ ^٤ ± ٠ × ١٠ ^٣ ، ٦,٨ × ١٠ ^٥ ± ٢,٣ × ١٠ ^٥ ، ٧,٩ × ١٠ ^٣ ± ١,٨ × ١٠ ^٢ بالترتيب. إن إنخفاض العد الميكروبيولوجى وإنخفاض العزل البكتريولوجى فى عينات الجبن المملح ربما يعزى الى إرتفاع نسبة ملح الطعام وزيادة الحموضة فى هذا المنتج . تم عزل الميكروب السبحى القولونى والعصوى القولونى والعنقودى الذهبى من عدد ٢٦ ، ٣٣ ، ٣ عينات بالترتيب من عينات الجبن الإجمالية . أثبتت الدراسة أن الجبن المصنع فى المنيا الطازج سواء القريش أو الدمياطى قد تم صنعة ومداولته بطريقة أقل من المستوى الصحى المطلوب . لذا يجب أن يتم صنع ومداولة هذه المنتجات تحت رعاية صحية عالية لما لها من أهمية.

SUMMARY

Sixty random samples of different types of soft cheese (20 samples each of Dammietta, fresh and pickled kareish cheese) were randomly collected from

different markets in Minia city. The microbiological counts showed that the average values of total colony, coliform, *staph. aureus*, enterococcus and yeast and mould counts in fresh kareish cheese were $2.9 \times 10^8 \pm 0.6 \times 10^8$, $52 \times 10^7 \pm 1.9 \times 10^7$, $8.9 \times 10^7 \pm 5.9 \times 10^7$; $7.2 \times 10^7 \pm 1.1 \times 10^7$ and $2.4 \times 10^7 \pm o.^7 \times 10^7$ and in pickled kareish cheese were $1.2 \times 10^4 \pm 1.1 \times 10^4$, $3.4 \times 10^2 \pm 1.6 \times 10^2$, $7.8 \times 10 \pm 0.8 \times 10$, $8.1 \times 10^3 \pm 2.5 \times 10^2$ and $4.2 \times 10^2 \pm 1.3 \times 10^2$; while in Dammietta cheese they were $1.7 \times 10^6 \pm 9 \times 10^3$, $2.6 \times 10^5 \pm 1.2 \times 10^4$, $6.3 \times 10^4 \pm 0.^3 \times 10^2$, $6.8 \times 10^5 \pm 2.3 \times 10^5$ and $7.9 \times 10^3 \pm 1.8 \times 10^2$, respectively. The high percentage of sodium chloride and increased acidity in pickled kareish cheese inhibited the growth of existing contaminant and hence low counts and isolates were obtained from this product. The obtained results revealed that *Strept. faecalis*, *E. coli* and coagulase positive *Staph. aureus* could be isolated from 26, 33 and 3 of cheese samples, respectively. The present study prove that the fresh kareish and Dammietta cheese in Minia city were manufactured, handled under neglected sanitary measures. Therefore, strict hygienic measures should be adopted during production of such valuable products.

Key words: Cheese - Microbilogy - Minia City.

INTRODUCTION

Cheese is universally recognized as a first class food, due to its exceptional richness in high quality animal protein and milk fat. Also it is a source of calcium, phosphorus, preformed vitamin A and B_2 and many micronutrients. Karish and Dammietta cheese are the most popular varieties in Egypt..

Aboul-khier et al .(1985) examined 21 kareish cheese samples collected from Sohag city markets and they found that Enterobacteriaceae could be detected in 85.7% of the samples with a mean value of $1.01 \times 10^6 \pm 58.1 \times 10^4$ / g., while *Escherichia coli* and klebsiella spp. were isolated in different percentages from the examined samples. Salmonella and shigella organisms could not be detected. Ahmed et al. (1988) examined 40 random samples of kareish cheese collected from Assiut city markets and they found that the mean counts of total coliform and faecal coliform were $2.63 \times 10^4 \pm 9.57 \times 10^3$ and $1.85 \times 10^4 \pm 6.40 \times 10^3$ respectively, while *Escherichia coli* was detected in 75% of the examined samples. EL-Kholy (1989) examined 100 samples,

50 fresh kareish cheese, and 50 Dammietta cheese, collected from Beni-Suef city markets and shops, for the isolation and identification of Enterobacteriaceae which were detected in 23.5 % and 10% of the examined samples respectively. Salmonella and shigella organisms were not detected . Said and Fahmy (1991) examined Dammietta and kareish cheese (fifty samples each) and could isolate *Escherichia coli* from 32 and 36 samples with average counts of $36x10^4$ and $39x10^4$, respectively. Abd-EL-Samie (1991) examined 50 Dammietta cheese samples collected from different localities in Kaliobia governorate and found that the average count of the Enterobacteriaceae was $2.15x10^4 \pm 1.28x10^4$ /g., while the mean coliform count was $2.44x10^4 \pm 1.20x10^7$ /g. *Escherichia coli* was detected in 20 % of the examined samples. Abd-El-Hakiem (1992) mentioned that *Staph. aureus* was detected in 64 % of examined kareish cheese samples.

Aman (1994) examined microbiologically 40 random kareish cheese samples collected from Kafr EL-Sheikh city and found that *Escherichia coli*, enterobacter and streptococcus were recovered in different percentages. He found that the average value of total colony count was $2.6x10^8$/gm. Allam (1995) found that out of 35 kareish cheese samples, 27 samples were positive to coliform (77.1%). He also isolated 6 (17.1%) klebsiella spp.from 35 white pickled cheese samples and 16(45.7%) isolates were coliform .

Recently, Sabreen (1996) studied the incidence of *Staph.aureus* in Dammietta cheese collected from Assiut City markets and it was isolated from 49% of the examined samples with an average count of 34X 10 5 organisms/g. Also, Badawe (1997) explorate the role of dairy products as source of some bacterial zoonoses. She used samples from different soft cheeses. Results showed that the highest percentage of coliform count was 80 % in kareish cheese samples.

The main object of the present investigation was directed to detect and judge the microbiological quality of different types of white soft cheese manufactured in Minia governorate.

MATERIAL and METHODS

Sixty random Samples of different types of cheese (20 samples each of fresh, pickled kareish and fresh Dammietta cheese) were collected from different markets at Minia city. Samples were collected in clean, dry and sterile wide mouth jars and were transferred to the laboratory with a

minimum of delay. Preparation of the samples for microbiolagical examination was carried out according to American public Health Association (A.P.H.A. 1985) and subjected to the following examinations.

Microbiological counts.

Total colony forming unit (CFU) count was carried out according to A.P.H.A. (1985) and Coliform count (MPN) was employed according to I.C.M.S.F (1986). Enterococcus count was done according to Efthymiou and Joseph (1974). *Staphylococci aureus* and Yeast and mould counts were performed according to A.P.H.A. (1985).

Isolation and Identification of bacterial isolates.

Blood agar and Baired Parker agar plates were used for isolation of gram positive cocci. Isolates were identified according to Carter (1975) and Cowan (1979). MacConkey's agar and Cesulodin-Iryasan-Novobiocin (CIN) agar plates were used for isolation of gram negative rods. Isolates were identified according to Merchant and Paker (1961), and Cruickshank et al. (1975).

RESULTS

The obtained results were recorded in Tables 1 and 2.

DISCUSSION

White cheese manufactured in Minia governorate, like other milk products, are liable to be contaminated with different types of microorganisms from different sources. Steps of collection and transportation of milk used in the manufacture, heat treatment and the procedure and chain of production greatly affect the quality of cheese produced from the sanitary point of view. Moreover, the way of keeping the final product also act on the fitness of such product for human consumption. Results recorded in Table (1) showed that the average value of total colony, coliform, staphylococcus, enterococcus, yeast and mould counts in fresh kareish cheese were $2.9 \times 10^8 \pm 0.6 \times 10^8$, $5.2 \times 10^7 \pm 1.9 \times 10^7$, $8.9 \times 10^7 \pm 5.9 \times 10^7$, $7.2 \times 10^7 \pm 1.1 \times 10^7$ and $2.4 \times 10^7 \pm 0.7 \times 10^7$; in pickled kareish cheese were $1.2 \times 10^4 \pm 1.1 \times 10^4$, $3.4 \times 10^2 \pm 1.6 \times 10^2$, $7.8 \times 10 \pm 0.8 \times 10$, $8.1 \times 10^3 \pm 2.5 \times 10^2$ and $4.2 \times 10^2 \pm 1.3 \times 10^2$; while in Dammietta cheese were

$1.7 \times 10^6 \pm 9 \times 10^3$, $2.6 \times 10^5 \pm 1.2 \times 10^4$, $6.3 \times 10^4 \pm 0.3 \times 10^2$, $6.8 \times 10^5 \pm 2.3 \times 10^5$ and $7.9 \times 10^3 \pm 1.8 \times 10^2$ respectively. These counts were slightly differed from those reported by Ahmed et al. (1987) and Tawfek et al. (1988) specially in the coliform counts. *Streptococcus faecalis* in fresh and Dammietta cheese were recovered at a percentage of 55% and 45% respectively (Table,2). Nearly similar results were reported by Hafez (1984). The percentage of *Escherichia.coli* in fresh kareish and Dammietta cheese were 80% and 60% respectively. Nearly similar incidence (75 %) was detected by Ahmed et al. (1987). Coagulase positive *Staphylococcus aureus* was isolated from 10% & 5% in fresh kareish cheese and Dammietta cheese respectively . Nearly similar findings were reported by Tawfek et al. (1988) , while high incidence was recorded in fresh kareish cheese by Aman (1994).

In pickled kareish cheese the percentage of *Streptococcus faecalis*, *E.coli* and coagulase positive *Staphylococcus aureus* were 30%, 25% and 0 % (Table,2).. These findings point out that the presence of high percentage of sodium chloride, spices and increased acidity in pickled kareish cheese are inhibiting factors control the growth of existing contaminants, and hence lower counts & isolates were obtained from this product than from fresh kareish & Dammietta cheese samples

Most foods especially dairy products should be regarded as unsatisfactory when they have a large number of microorganisms even if these organisms are not known to be pathogenic. High aerobic plate counts often indicate contaminated raw materials or unsatisfactory processing from sanitary point of view. Some strains not usually regarded as causing food borne diseases (e.g. enterococci) have been reported to cause illness when excessive numbers of living cells were present in food beside its spoilage effect. Enterococci are normally present in faeces and also occur in environment. Their detection in dairy products in large numbers implies either inadequate sanitary practices or exposure of the food to condition that would permit extensive multiplication of such undesirable bacteria. Also they have been implicated in some cases of food poisoning (George and Uttley, 1989).

Results of the mean count of Yeast and Mould per g. of the examined soft cheese samples are presented (Table,1). Yeast and mould counts in cheese are used as an index of the proper sanitation quality. Defects in these unripened soft cheese such as rancidity, softness and colour defects arise mainly from contamination by yeast and mould. Moreover, in view of the potential ability of some moulds to produce mycotoxins during their growth,

thus, their presence posses potential hazards to food safety and human health (Rippon, 1982; Scott, 1989 and Kivance, 1990)

According to the International Dairy Federation in dairy products, IDF (1982), the count of coliform in soft cheese not exceed 10^3 C.F.U. / g. Ottogalli et al. (1985) proposed maximum limits for aerobic plate count & faecal Streptococci 10^4 - 10^5 C.F.U./g.; coliforms 10^2 - 10^3 C.F.U./g.;. coagulase positive staphylococci (Non). Moulds 10^2- 10^3 C.F.U./g. and yeasts 10^4-10^5 in some fresh cheeses. Data obtained during this investigation exceed such bacterial limits.

Streptococcus faecalis could be isolated with different percentages from fresh, Pickled kareish and Dammietta cheese samples (Table2). The presence of this organisms in cheese is a definite prove of faecal contamination Cruickshank et al.(1975). *Escherichia coli* could also be isolated from fresh, Pickled kareish and Dammietta cheese samples. The presence of E. coli in cheese samples is an another indication of faecal pollution. Moreover, these organisms can grow in this product especially in hot climatic conditions resulting in undesirable changes in the product besides they constitute a public health hazard Thomason et al. (1961).

The presence of *Staphylococcus aureus* in cheese usually indicate contamination of milk from diseased udder or external sources including dairy animals, hands, sneezing & coughing of dairy workers. Sabioni et al. (1988) reported an outbreak of food poisoning in Brazil from cheese contaminated with *Staphylococcus aureus* at a level of 9.3x10 / g.

Generally, soft cheese is among the dairy products mostly incriminated in cases of food poisoning in Egypt (Hegazi, 1972). The main reason for this problem is that most of such cheeses available in the markets are made from raw milk under primitive conditions. In conclusion, the results obtained allow to conclude that the fresh kareish and Daminietta cheese in Minia was manufactured and handled under neglected sanitary measures. Therefore, strict hygienic measures should be adapted during production of such valuable product.

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Table 1: Statistical analytical results of microbiological counts/g of the examined soft cheese.

Type of soft cheese	Max.	Min.	Mean	SED ±
Fresh Kareish cheese				
Total Colony count	$4.7x10^9$	$12x10^6$	$2.9x10^8$	$0.6x10^8$
coliform count	$8x10^8$	$2x10^3$	$5.2x10^7$	$1.9x10^7$
Staph. aureus count	$3.9x10^8$	$2.1x10^3$	$8.9x10^7$	$5.9x10^7$
Enterococci count	$2x10^8$	$3.5x10^4$	$7.2x10^7$	$1.1x10^7$
Total yeast & mould count	$9x10^7$	$1.2x10^4$	$2.4x10^7$	$0.7x10^7$
Pickled kareish cheese				
Total colony count	$3.9x10^5$	$4.3x10^2$	$1.2x10^4$	$1.1x10^4$
coliform count	$6x10^3$	$0.3x10^2$	$3.4x10^2$	$1.6x10^2$
Staph. aureus count	$1.4x10^2$	$2.9x10$	$7.8x10$	$0.8x10$
Enterococce count	$3.6x10^4$	$1.4x10^2$	$8.1x10^3$	$2.5x10^2$
Total yeast & mould count	$7.7x10^3$	$3.6x10$	$4.2x10^2$	$1.3x10^2$
Dammietta cheese:				
Total colony count	$2.6x10^7$	$2.9x10^4$	$1.7x10^6$	$0.9x10^3$
Coliform count	$6.8x10^6$	$2.3x10^4$	$2.6x10^5$	$1.2x10^4$
Staph. aureus count	$7x10^5$	$9.3x10^2$	$6.3x10^4$	$0.3x10^2$
Enterococci count	$7x10^7$	$4.3x10^3$	$6.8x10^5$	$2.3x10^5$
Total Yeast & mould count	$9.6x10^4$	$8.2x10^2$	$7.9x10^3$	$1.8x10^2$

Table 2: Incidence of isolated organisms recovered from the examined soft cheese samples.

Isolated Organisms	Fresh kareish cheese Positive samples		Pickled kareish cheese Positive samples		Dammietta cheese Positive samples	
	No./20	%	No./20	%	No./20	%
Strept.faecalis	11	55	6	30	9	45
Escherichia coli	16	80	5	25	12	60
staph. aureus Coagulase +ve	2	10	0	0	1	5