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CHEMICAL AND MICROBIOLOGICAL EVALUATION OF MARKET RAS CHEESE

(With 3 Tables)

By

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التقييم الكيماوى والميكروبيولوجى لجبن الرأس بالاسواق

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تم تجميع خمسة وعشرون عينة جبن رأس من أسواق مدينة الاسكندريه وحللت لمحتواها من الحموضه ، الرطوبه ، الدهن / الماده الجافه ، الملح / الماده الجافه. ولقد دلت النتائج ان المتوسطات كانت ٢٢ر٢ ، ١٦ر٢٣ ، ١٠ر٤٩ ، ٨٤ر٥ ٪ على الترتيب.

كما حللت العينات لمحتواها من العد الكلى للبكتريا ، بكتريا القولون العصويه ، ال Staphylococci والبكتريا المكونه للجراثيم الهوائيه واللاهوائيه ... وكانت المتوسطات :- ١ر٧ x ١٠ ، ٢ر٧ x ١٠ ، ٤ر٢ x ١٠ ، ٩٨و على الترتيب .

وقد احتوت ٦٠ ٪ من العينات على بكتريا القولون العصويه والتى صنف الى :-

١ - فى ٣٢ ٪ من العينات Escherichia coli
٢ - فى ١٢ ٪ Enterobacter aerogenes
٣ - فى ٨ ٪ Enterobacter cloacae
٤ - فى ٤ ٪ Citrobacter freundii
٥ - فى ٤ ٪ من العينات Hafnia alvei

كما احتوت جميع العينات على بكتريا ال Staphylococci ومثلت ال Staphylococcus aureus ٢٠ ٪ منها .

كما احتوت جميع العينات على البكتريا الهوائيه المكونه للجراثيم فى حين احتوت ٦٠ ٪ منها على البكتريا اللاهوائيه المكونه للجراثيم ... كما ثبت ان جميع العينات ملوثه بنسبة عاليه بالخمائر والفطريات .

وقد تم مناقشة الاهميه الصحيه للميكروبات المعزوله على الصحه العامه للمستهلك وجودة المنتج.

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SUMMARY

Twenty five samples of market Ras cheese were randomly collected and examined for chemical composition and microbiological quality. The average percentages of acidity, moisture, fat/DM and salt/DM were 2.22, 23.16, 49.01 and 5.84, respectively. The averages of total colony, coliforms, Staphylococci, aerobic spore-forming and anaerobic spore-forming counts per gram were $1.7x10^6$, $1.2x10^3$, $2.4x10^4$, $2x10^4$ and 0.98 in order. Coliforms were detected in 60% of the examined samples and were identified as Escherichia coli (32%), Enterobacter aerogenes (12%), Enterobacter cloaca (8%), Citrobacter freundii (4%) and Hafnia alvei (4%). Staphylococci were detected in all of the examined samples and 20% of them were identified as Staphylococcus aureus. Aerobic spore-forming and anaerobic spore-forming were detected in 100% and 60% of the examined samples respectively. Ras cheese samples were highly contaminated with total yeast and moulds with an average of $9.8x10^3$/g.

INTRODUCTION

It's well known that the nutritional importance of cheese mainly arises from its high content of biologically valuable proteins and it can contribute significantly to the supply of essential amino acids as well as minerals and vitamins.

On the other hand, it was reported that the contaminated cheese may cause some infectious diseases and food poisoning (*BASARABAS* et al., *1964 and ELIAKES* et al., *(1966)*. So, sanitation and legal instructions should be taken in consideration during manufacturing, marketing and handling of cheese.

Recently, few studies were carried out on quality of market Ras cheese. *YOUSSEF (1966) and MEHANNA (1981)* examined twenty five and fifty cheese samples collected from Cairo markets in order whereas ten samples from Alexandria markets and thirty five samples from Behera and Bani-Swief markets were analysed by *ATTIA and GOODA (1987) and Saleh (1989)*, respectively.

This work was mainly devoted to contribute on chemical composition and microbiological quality of market Ras cheese in Egypt.

MATERIALS and METHODS

Collection and analysis of samples:

Twenty five Ras cheese samples were randomly collected from different groceries and supermarkets in Alexandria city and immediately transferred promptly in an insulated ice box (<5°C) to the laboratory. About 20 grams from cheese samples were thoroughly mashed in a sterile morter and chemically analysed for titratable acidity as given by *LING (1963)*, moisture and fat contents according to *A.P.H.A> (1985)* and salt content as recommended by *A.O.A.C. (1980)*.

All cheese samples were also microbiologically analysed for total colony count as described by *IDF (1987)*. Counts and identification of coliform organisms and Staphylococci were carried out according to *THATCHER and CLARK (1978)*. Aerobic and anaerobic spore-formers were counted according to *A.P.H.A. (1985)*. Total yeast and mould counts were determined as given by *CRUICKSHANK* et al. *(1975)*.

The attained data were statistically analyzed according to *STEEL and TORRIE (1960)*.

RESULTS

All results, obtained were recorded and tabulated in Tables 1-3.

DISCUSSION

1- Chemical analysis:

The results given in Table (1) show that the min. percentage of titratable acidity in cheese samples was 1.5% and the max. was 3.51% with an average of 2.22 ± 0.122% Much lower values were reported by *SALEH (1989)* namely 0.45, 1.68 and 1.04 ± 0.038% respectively.

It is evident from the same table that the min. Moisture content was 14.0% and the max. was 36.33% with an average of 23.16 ± 1.08%. This wide range of variation disagree with that given by *YOUSSEF (1966) and ATTIA and GOODA (1987)* being 39.56-40.86% and 32.0-36.79% respectively. Also, *MEHANNA (1981)* found that the average moisture content of Ras cheese from Cairo markets was 36.12 ± 0.178%. However all samples comply with the Egyptian legal limit for moisture content namely 40% as the max. (Egyptian standards, 1970).

The fat content of Ras cheese (F/ DM) varied widely from 44.22 to 54.78%. Only 3 samples failed to confirm with the legal requirements of the Egyptian Standard (1970) namely not

less than 45%. The average F/ DM contents given by *YOUSSEF (1966) and MEHANNA (1981) were 48.5% and 40.61* ± 0.6029% in order, whereas *ATTIA and GOODA (1987)* reported a wider range of variation being 36.38-50.66% with an average of 43.42%.

Concerning salt content (on dry matter), it ranges from 4.18 to 8.17% with an average of 5.84% (Table 1). The values (per se) given by *YOUSSEF (1966) and MEHANNA (1981)* were 3.88% and 3.28 ± 0.0569% in order, whereas min., max. and average values (on dry matter) given by *ATTIA and GOODA (1987)* were 5.93, 6.92 and 6.31% and by *SALEH (1989)* were 5.3, 8.5 and 7 ± 0.132% (per se) respectively.

The variations in the chemical composition of market Ras cheese given by different authors could be attributed to the lack of standardized conditions with respect to chemical composition of milk and manufacturing process of cheese.

2-Microbiological examination:

It is evident from Table (2) that the min. total colony count/ gm of the examined samples was 3.1×10^4 and the max. was 6.7×10^6 with an average of $1.7 \times 10^6 \pm 4.7 \times 10^5$. The corresponding counts of coliform (MPN/ gm) were zero, 1.1×10^4 and 1.2×10^3, respectively.

The coliforms were detected in 15 (60%) out of 25 examined samples. No coliforms were detected in market hard cheese examined by *MEHANNA (1981),* whereas *SALEH (1989)* reported the presence of coliforms in 1.26×10^4/ gm of cheese.

It may be of interest to point out that Staphylococci were detected in all samples examined (Table 2) with min. counts of 1×10^2, max. 8.8×10^4 and average of $2.4 \times 10^4 \pm 6.4 \times 10^3$ org./ gm.

The results recorded in Table (2) show that min. counts of aerobic spore-forming and anaerobic spore-forming becteria were 1.3×10^2 and Zero, whereas the max. counts were 6.2×10^4 and 0.23×10^2 and the average counts were $2 \times 10^4 \pm 3.5 \times 10^2$ and 0.98 ± 0.209 respectively.

All cheese samples were highly contaminated with yeast and moulds. The min and max. counts of them were 2×10^2 and 4.3×10^4 with an average of $9.8 \times 10^3 \pm 3 \times 10^3$. The presence of yeasts and moulds in market hard cheese was previously reported by *MEHANNA (1981) and EL-ESSAWY* et al. *(1984).*

Coliforms bacteria were identified as Escherichia coli, Enterobacter aerogenes, Enterobacter cloacae, Citrobacter freundii and Hafnia alvei and their occurrence in percentages of the total sample analysed were 32,12 , 8, 4 and 4%, respectively. Also, Staphlococcus aureus were detected in 20% of the examined samples (Table 3).

The presence of yeast and moulds as wellas coliforms and other hazardous microorganisms offer a serious problem with public health and indicate to lack sanitation during processing, handling and marketing such kinds of cheese in different localities in Egypt.

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Table 1 : Chemical composition of market Ras cheese*

Property	Min.	Max.	Average	SE
Acidity %	1.5	3.51	2.22	0.122
Moisture %	14.0	36.33	23.16	1.081
Fat/DM%	44.22	54.78	49.01	0.612
NaCl/DM %	4.18	8.17	5.84	0.998

* Range and average of 25 samples .

Table 3 : Incidence of coliforms and Staphylococci occurred in Ras cheese samples.

Organism	No. of positive samples	% of total
Escherichia coli	8	32
Enterobacter aerogenes	3	12
Enterobacter cloacae	2	8
Citrobacter freundii	1	4
Hafnia alvei	1	4
Staphylococcus aureus	5	20

Table (2) : Microbiological examination of market Ras cheese* (counts per g of cheese.

Property	Positive samples		Min.	Max.	Average	SE
	No.	%				
Total colony count	25	100	3.1×10^4	6.7×10^6	1.7×10^6	4.7×10^5
Coliform	15	60	Zero	1.1×10^4	1.2×10^3	0.6×10^3
Staphyloccooi	25	100	1×10^2	8.8×10^4	2.4×10^4	6.4×10^3
Aerobic spore-forming	25	100	1.3×10^2	6.2×10^4	2×10^4	3.5×10^2
Anaerobic spore-forming	15	60	Zero	0.23×10^2	0.98	0.209
Total yeast and mould	25	100	2×10^2	4.3×10^4	9.8×10^3	3×10^3

* Range and average of 25 samples.