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Chemical, Microbiological and Sensory Evaluation of some Roquefort Cheese Existed in Egyptian Markets



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ABSTRACT

Eight blue-veined type cheeses (one domestic, seven imported Roquefort cheeses) were examined. Results showed that, % of fat and fat in dry matter ranged between (29 to 36) and (52.51 to 64.96), respectively. Moisture and total solids contents ranging between (39.44 to 45.02) and (54.98 to 60.56) respectively, while soluble nitrogen and amino nitrogen, were (42.51 and 50.48), (18.21 to 22.00) respectively. Total protein and its percentage in the dry matter, the results ranging between (18.66 to 23.00) and (31.22 to 43.60) respectively. the concentrations of both tyrosine and tryptophan acids ranged from (0.36 to 0.44) and (0.42 to 0.55). free fatty acids and volatile fatty acids, ranged from (33.00 to 70.00) and (15.00 to 42.00) . The microbial load ranged between (2.3×10^5 to 18.5×10^5). While fungi and yeasts ranged between (14.5×10^5 to 150.1×10^5) cfu. Coliform bacteria group and the anaerobic spore former bacteria had not been detected in all investigated cheese samples. study showed that the presence of roquefortin C in all cheese samples with a range of (1.9 to 5.21) with an average of 3.58, and the cheese samples number 3, 7, and 8 contained benicelic acid and were not detected in the rest of the samples, while the study confirmed that all samples, were completely devoid of both aflatoxin G1, M1, B2, and B2.

Keyword: blue veined cheese , Roquefort cheese , mycotoxin , aflatoxin.



INTRODUCTION

Blue or blue veined cheese (roquefort type) is semi soft or semi hard cheese represents a cheese type of considerable commercial importance in the United States (Gripson, 1993)..A very broad definition for the blue veined cheeses would be, a cheese characterized in appearance and flavour by the growth and development of the fungal-species, *Penicillium roqueforti*, either naturally or through inoculation, that has a 4-5 % salt content, possesses a spicy, piquant flavour and a moist texture showing slight stickiness with a tendency to crumble (Kosikowski, 1970).

During ripening period, blue veined cheeses undergo extensive proteins and lipids hydrolysis resulting in odour, flavour, appearance and texture development (Fox et al., 2000). Manufacture of blue veined cheese with typical and high quality flavor is mainly affected by milk type, species of moulds used, rate of starter growth and salt percentage. It is well known and established that cheese ripening is a complex process involving the hydrolysis of the curd by proteolysis, lipolysis and other enzymes-catalyzed reactions to give the flavor and texture changes typical of the different cheese varieties. These reactions are occurred by milk enzymes, rennet, starter cultures, the moulds and yeasts and the cheese milk micro flora (Kinsella and Hawng 1976).

Blue-veined cheeses are unique among other varieties in that holes are deliberately created to allow more oxygen to enter the cheese (Nelson, 1970). Oxygen facilitates the growth and sporulation of *P. roqueforti* as well as the development of 6 characteristic Blue cheese

flavor (Kinsella and Hwang, 1976). Blue-type cheeses are typically aged at 8 to 15 degrees Celsius for 60 to 90 days (Karlin, 2011). A variety of blue cheeses worldwide, such as the very famous French Roquefort, English Stilton, Spanish Cabrales, Danish Danablu or Italian Gorgonzola, industrials use specific strains of the fungal ascomycete species, *Penicillium roqueforti*. Originally, *P. roqueforti* was not inoculated while blue cheese manufacture but contaminated the milk spontaneously with spores from the surrounding environment. Since the end of the 18th century, *P. roqueforti* asexual spores (conidia) are inoculated into the cheese curd (Labbe and Serres 2009, 2004) at the beginning of the cheese-making process.

Several methods have been applied to enhance the quality of different types of cheese and accelerate their ripening process, such as increasing the ripening temperature, addition of modified starter culture (heat shocked), cheese slurry, trace elements as well as addition of enzymatic mixtures (Hofi et al., 1973. Jolly and Kosikowski (1975) used microbial lipases to accelerate the development of blue cheese flavour . The production of blue-type cheese flavorings by submerged culture fermentation has been well documented in patent and scientific literature (Pratt 1989; Taylor 1995; Jolly and Kosikowski 1975; Dwivedi and Kinsella 1974). Typical embodiments of Blue cheese flavoring production involve the use of *Penicillium roqueforti*, a source of medium chain. Blue-type cheeses are enjoyed around the world for their unique strong and piquant flavors.

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Lactic acid bacteria were reported to the dominant group from salting on words, while moulds and yeasts were dominant during ripening (Lopez-Diaz et al., 1996) *Penicillium roqueforti* has been used as a secondary starter culture for the ripening of blue-mould cheeses, such as Gorgonzola, Danabule, Roquefort, Bleu de Bresse and Stilton for centuries. Because of the presented with lactic acid bacteria, *Penicillium roqueforti* is resistant to lactic acid, acetic acid, carbon dioxide and several other lactic acid bacterial intermediate metabolites (Boysen et al., 2000). The presence of mycotoxin in dairy products may be attributed to indirect contamination, which results from lactating animals ingesting contaminated feed and direct contamination, which occurs because of intentional or accidental growth of moulds on dairy products (Lafont et al., (1990) and (van Egmond 1989). Some of the fungal starters used in the cheese manufacture have been shown to produce various mycotoxins on culture media. *P. roqueforti*, widely used as a mould starter culture in the blue cheeses, is known and fixed to produce Roquefortine C, PR-toxin, mycophenolic acid and isofumigaclavins (Samson and Frisvad, 2004) and (Frisvad et al., 2004). Roquefortine C had been detected in the cheeses with

range from 0.05 to 1.47 mg/kg-1, while PR-toxin or penicillic acid could not be detected in blue cheeses, Schoch et al. (1984). Recent investigation showed that, *Penicillium roqueforti* do not produce these mycotoxin metabolites, but the closely related *P. carneum* and *P. paneum* produce (Erdogan et al., 2003 and Samson and Frisvad, 2004). The other microorganisms accompanying starters may be present in mould cheeses. The objectives of the present research were to determine the gross compositional constituents of a number of blue-type cheeses existed in Egyptian markets and to evaluate their nutritional values. As well as to determine the incidence and the level of some mycotoxins in blue cheeses samples collected in order to evaluate its safety.

MATERIALS AND METHODS

Eight blue-type cheese samples were collected from Egyptian local markets (2-6 months) the brand and the description shown in Table (1) and Fig (1), Cheese samples were analyzed in duplicate, and they are stored at 4°C prior to analysis. All chemicals and reagents used in this study were of analytical grade supplied by BDH and Sigma companies.

Table 1. The brand name and description of cheese:

	Brand Name	No of samples	Description and weight.
Brand 1	Egyptian roquerort cheese	6	In triangles shape 100 g.
Brand 2	Moby blue cheese	3	Cheese wheel (blue mark) 1Kg
Brand 3	Danish Blue Cheese	3	Cheese wheel (blue mark) 1Kg
Brand 4	Rosenborg Mellow Blue Danish Cheese.	6	Triangles shape 100 g
Brand 5	Lady Bird Mellow	6	Triangle (Blue mark) 100 g
Brand 6	Moby blue cheese	6	Triangle (green mark) 100 g
Brand 7	Rosenborg Danish Blue Cheese.	6	Triangle shaped 100 g
Brand 8	Lady Bird	6	Triangle shaped (Golden mark) 100 g.

Chemical analysis:

Moisture, Total solids content, titratable acidity, soluble nitrogen measured using (micro-kjeldahl method), amino nitrogen, and ash were estimated according to A.O.A.C (2000). The total protein was calculated as TN % x 6.38 (Plummer, 1988). Fat content estimated using Gerber method according to Ling (1963). The salt contents were determined by using the "Mohr method" of A.P.H.A (2004). Total volatile fatty acids (TVFA) and Free fatty acids (FFA) were determined by the method of Kosikowski (1977). Tyrosine and tryptophane were spectrophotometrically determined by the method described by Vakaleris and Priece (1959).

Bacteriological analyses:

Samples preparation and dilutions for the microbiological examinations were carried out according to IDF standards (1996). Total Bacterial Count (T.B.C.) in cheese samples was determined with the standard plate count technique according to A.P.H.A., (2004). The presence of coliform bacteria was examined by the multiple tube technique, the sample dilutions were inoculated into MacConky broth medium according to (Difco manual, 1998). The presence of anaerobic spore former bacteria was examined according to A.P.H.A., (2004).

Extraction of mycotoxins:

The sample preparation and mycotoxin extraction procedure was done according to the method of Rundberget and Wilkins (2002).

Mycotoxins detection:

Mycotoxins extracted from cheese samples were determined by thin layer chromatographic technique on pre-coated silica gel plate 60 F254 (Merck) as described by El-Kady and Moubasher (1982). Mycotoxins were identified by comparison with appropriate reference standards of mycotoxins using solvent system of chloroform: acetone (90:10, v/v) for Aflatoxins.

Organoleptic properties:-

Panel test of cheese samples was carried out according to El-Hofi *et al.*, (1991) as in the following system, flavour 50. Body & Texture 40 and general appearance 10 points. The panel test was carried out by 10 panelist from both Dairy science Department, Assuit University.

RESULTS AND DISCUSSIONS

The gross chemical composition in eight blue-mould cheeses are shown in Tables (2), from the data it was observed that the titratable acidity and PH values of cheese varied from 2.17% with corresponding PH values of 5.39 to 2.57 % with corresponding P^H values of 4.95 with an average of 2.27 and 5.18 for brand 7 and brand 4 respectively. Also it was found that the cheese brand number 7 had the lowest values of salt percentage 3.73% and consequently salt in cheese serum (8.29%) and the brand number 3 recorded the highest values in both with 3.73, 8.29 and 5.83, 12.95 respectively, the mean values

in both of salt content and (S/M) of all cheese samples 4.43 and 10.41 respectively. The fat content and the fat in dry matter was varied from 29.00 to 36.00 (brand 7 and both of brand 1 and 5) and from 52.41 to 64.96 (brand 2 and brand 5) in the same respect. With regard to moisture and corresponding total solids the cheese brand number 3 and 7 recorded the highest values (45.02) while the lowest value were recorded in cheese brand 7 and vice versa in the corresponding total solids. The mean values of both of acidity, PH, salt, S/M, fat, F/DM, moisture contents and total solids were 2.27, 5.18, 4.43, 10.41, 32.50, 42.56, 57.44 and 56.58 respectively. These results are in agreement with that stated in the Egyptian standards (ES:1183- 2/2005). The obtained results are in accordance with those obtained by J. Fernandez- salguero (2004)

The results presents in Table (3) represents the chemical properties of blue veined cheese existing in Egyptian local market. The data indicated that the soluble nitrogen (SN) in all analyzed cheese samples were varied from 42.51 (brand 1) to 50.48 (brand 3) with an average of 47.39, it was also observed that the amino nitrogen (AN) values was lowest than the SN values which varied from 18.21 to 22.00. With regard to the total protein (TS) and protein in dry matter (P/DM) it was noticed that the cheese brand number (1) had the lowest values of TP and P/DM (18.66 and 31.22) while the highest values were 23.00 and 43.60 of cheese brand number (7) in the same respect. The results agree with the obtained data by El-Zahar *et al* (2008)

Table 2. Gross compositional analysis of blue-type cheeses.

Chemical Properties	Acidity %	PH	Salt %	S/M	Fat %	Moisture %	TS %	F/DM%
Brand 1	2.27 ±0.01	5.00 ±0.015	4.43 ±0.03	11.14 ±0.075	36.00 ±0.5	39.76 ±1.05	60.24 ±1.05	59.76 ±0.83
Brand 2	2.3 ±0.00	5.11 ±0.025	4.23 ±0.035	10.12 ±0.08	30.5 ±0.1	41.80 ±0.92	58.20 ±0.92	52.41 ±0.17
Brand 3	2.21 ±0.01	5.27 ±0.07	5.83 ±0.04	12.95 ±0.02	29.5 ±0.25	45.02 ±0.54	54.98 ±0.54	53.66 ±0.46
Brand 4	2.57 ±0.01	4.95 ±0.36	4.83 ±0.045	11.54 ±0.1	35.00 ±0.11	41.85 ±0.79	58.15 ±0.79	60.19 ±0.20
Brand 5	2.23 ±0.025	5.23 ±0.015	4.5 ±0.15	10.09 ±0.34	36.00 ±0.00	44.58 ±0.95	55.42 ±0.95	64.96 ±0.00
Brand 6	2.3 ±0.015	5.12 ±0.035	3.93 ±0.06	9.96 ±0.14	33.00 ±0.025	39.44 ±0.88	60.56 ±0.88	54.49 ±0.41
Brand 7	2.17 ±0.03	5.39 ±0.026	3.73 ±0.025	8.29 ±0.056	29.00 ±0.025	45.02 ±1.01	54.98 ±1.01	52.75 ±0.045
Brand 8	2.13 ±0.02	5.38 ±0.06	3.96 ±0.01	9.21 ±0.02	31.00 ±0.00	43.02 ±1.04	56.98 ±1.04	54.41 ±0.10
Mean	2.27	5.18	4.43	10.41	32.50	42.56	57.44	56.58

* Values expressed as g 100 g-1 cheese. F/DM: fat in the dry matter. S/M = salt in moisture.

On the other hand to determine the degree of protein degradation in cheese samples, the tyrosine (Tyr.) and tryptophane (Trp.) amino acids were measured (g 100 g⁻¹ cheese), from these results it was noticed that the Tyr. content was varied from 0.36 to 0.44 while the Trp. Values

was varied from 0.42 to 0.55, and it was observed that all measurement values of both of (Tyr.) and (Trp.) in all cheese brand to some extent were similar to each other consequently the mean values 0.41 and 0.49 respectively.

Table 3. Results of gross compositional analysis of blue-type cheeses

Chemical Properties	SN%	AN%	TP%	TP/DM	Tyr.%	Trp.%	TVFA%	FFA%	Ash%
Brand 1	42.51±0.25	18.21±0.46	18.66±0.6	31.22±0.84	0.44±0.02	0.49±0.03	19.00±1.52	33.0±1.00	4.61±0.01
Brand 2	45.01±0.33	22.00±0.90	20.21±0.30	38.56±0.50	0.39±0.035	0.42±0.02	25.00±0.76	38.0±0.76	4.18±0.01
Brand 3	50.48±1.03	19.25±0.50	22.35±0.35	41.65±0.60	0.45±0.05	0.55±0.00	56.00±1.52	69.0±0.30	4.19±0.03
Brand 4	47.33±0.17	19.55±0.55	19.23±0.40	31.95±0.70	0.36±0.03	0.56±0.05	22.00±0.68	40.0±1.00	4.33±0.03
Brand 5	48.21±0.20	20.21±0.25	21.03±0.41	32.37±0.74	0.42±0.02	0.49±0.01	17.00±1.20	40.2±0.55	4.35±0.02
Brand 6	44.55±0.50	17.00±0.61	19.55±0.50	35.88±0.83	0.43±0.025	0.47±0.05	15.00±0.11	39.25±0.22	4.62±0.10
Brand 7	51.72±0.60	21.32±0.35	23.00±1.00	43.60±1.81	0.39±0.01	0.44±0.04	45.00±1.00	62.2±2.10	4.33±0.06
Brand 8	49.30±0.25	18.79±0.36	22.56±0.50	41.46±0.88	0.42±0.025	0.53±0.03	42.00±0.43	70.0±1.21	4.64±0.10
Mean	47.39	19.54	20.82	37.09	0.41	0.49	30.13	48.96	4.42

SN: soluble nitrogen. AN: amino nitrogen. S/M = salt in moisture. TP: total protein. TP/DM in dry matter. Tyr. : Tyrosine Trp. : tryptophane.

TVFA : total volatile fatty acids expressed as (ml 0.1 NaOH/100mg)

The data indicate that a high rate of degradation. Considerable proteolysis occurs in blue-type cheese may be attributed to the action of both rennet and the of secondary starter enzymes such as *P. roqueforti* (Hewedi and Fox. 1984). A similar proteolysis was reported by Prieto *et al* (2000), also a strong protein degradation in blue cheeses is also reflected in their high contents of two soluble aromatic amino acids Tyrosine and Tryptophan which used as monitoring for cheese ripening as J. Fernandez- salguero (2004), (McSweeney and Sousa, 2000) and (Larsen, *et al.*, 1998). Concerning to the free fatty acids (FFA) and total volatile fatty acids (TVFA) which indicate to the degree of lypolysis occurring in cheese matrix, it was observed that all cheese samples recorded highest values of both (FFA) and (TVFA) due to

the highest lipase activity of *penicillium roqueforti* used in blue cheese manufacture, the values of both were varied from 33 to 70 (brand 1 and 8) and 15 to 42 (brand 6 and 8) respectively. Finally the ash values were ranged from 4.18 to 4.64 for cheese brand 2 and 8 respectively. The averages of both SN, AN, TP, TP/DM, Tyr., Trp., TVFA, FFA and ash were 47.39, 19.54, 20.82, 37.09, 0.41, 0.49, 30.13, 48.96 and 4.42 respectively. These results are in agreement with that stated in the Egyptian standards (ES:1183- 2/2005). From the obtained data it was observed that a blue cheese had a the highest lipolytic activity in all cheese varieties due to the non lactic acid starters *P. roqueforti* which possess a high lipase production (Gripon *et al* 1993).

The organoleptic properties of the investigated cheeses are presents in Table (4) which refer to the flavor scores varied from 38.00 (brand 3) to 44.26 (brand 4), while the body and texture varied from 32.00 (brand 3) to 36.17 (brand 7), but the general appearance of cheese brands ranged from 5.52 (brand 3) to 8.69 (brand 4). The brand number 4 gained the highest total score (90.04 points), on the other hand it was observed that the brand number 3 gained the lowest total score . In general the average of falvour, body & texture, appearance and total scores were 40.99, 35.20, 6.60 and 83.79 respectively. Fig. (1) shows the general appearance of eight brands of roquefort cheese,

it appear the degree of mold sweat inside the cheese matrix.

Table 4. Determination of sensory evaluation

Brand	Flavour (50)	Body & Texture (40)	Appearance (10)	Total score
Brand 1	41.00±1.50	35.22±5.00	7.43±0.50	83.65±3.00
Brand 2	39.96±1.14	34.65±1.06	7.87±0.43	82.48±1.60
Brand 3	38.00±1.00	32.00±1.00	5.52±0.25	75.52±4.53
Brand 4	44.26±0.40	37.09±0.75	8.69±0.33	90.04±2.00
Brand 5	43.39±0.87	35.96±1.14	7.96±0.35	87.30±2.50
Brand 6	38.17±0.18	34.09±0.90	7.39±0.76	79.65±2.40
Brand 7	41.39±0.34	36.39±0.40	8.09±0.41	85.87±1.78
Brand 8	41.74±1.38	36.17±0.95	7.87±0.46	85.78±2.05
Mean	40.99	35.20	7.60	83.79



Fig 1. The general appearance of eight brands of Roquefort cheese

Microbiological properties:

As shown in Table (5) the total bacteria counts in all cheese brands varied from 2.3×10^5 cfu/g (brand 6) to 18.5×10^5 for (brand 2) with an average of 6.36×10^5 cfu/g , while the total molds & yeasts counts were ranged from 14.5×10^3 to 150.1×10^3 cfu/g for brand 1 and 3 respectively. On the other hand the incidence of both coliform groups and anaerobic spore former bacteria were investigated and the final results revealed that neither coliform group nor anaerobic spore former bacteria had been detected in all cheese brands.

Table 5. Microbiological properties of blue viend cheese cfu/g cheese .

Microbiological properties	Total bacterial counts	Molds & yeasts counts	Coliform group	Anaerobic spore former bacteria
Brand 1	5.05×10^5	14.5×10^3	ND	ND
Brand 2	18.5×10^5	35.5×10^3	ND	ND
Brand 3	6.25×10^5	150.1×10^3	ND	ND
Brand 4	3.95×10^5	88×10^3	ND	ND
Brand 5	7.0×10^5	46.5×10^3	ND	ND
Brand 6	2.3×10^5	55×10^3	ND	ND
Brand 7	4.5×10^5	44×10^3	ND	ND
Brand 8	3.35×10^5	42.5×10^3	ND	ND
Mean	6.36×10^5	59.51×10^3	ND	ND

Mycotoxins in blue veined cheese :

The incidence and the concentration of mycotoxins in blue veined cheese samples had been investigated and the final results presents in Table (6) indicated that, all cheese samples contained *Requefortine C* ($mg\ kg^{-1}$) which varied from 1.9 to 5.21 with an average of 3.58 ($mg\ kg^{-1}$) for brand 6 and brand 1 respectively. While only brand cheese number 3, 7 and 8 had detectable *Penicillic Acid* which were 0.23, 0.42 and 0.40 respectively. The others examined mycotoxins in all cheese samples were not detected, This is likely to be due to best manufacturing practises applied in the cheese production. The raw materials, the manufacturing processes and the storage conditions are all strictly controlled in order to avoid mould contamination and mycotoxin formation (Engel and Tauber, 1989). Concentrations found in the samples were in accordance with the previous investigations by (Lafont *et al.*, 1990, Bentley, 2000, Finoli, *et al.*, 2001, Erdogan *et al.*, 2003 and Samson and Frisvad, 2004).

Table 6. Mycotoxins in blue veined cheese

Brand	Aflatoxin G1 (mg kg-1)	Aflatoxin M1 (mg kg-1)	Aflatoxin B1 (mg kg-1)	Aflatoxin B2 (mg kg-1)	Penicillic Acid (mg kg-1)	Roquefortine C (mg kg-1)
Brand 1	ND	ND	ND	ND	ND	5.21
Brand 2	ND	ND	ND	ND	ND	3.22
Brand 3	ND	ND	ND	ND	0.23	5.5
Brand 4	ND	ND	ND	ND	ND	2.4
Brand 5	ND	ND	ND	ND	ND	5.7
Brand 6	ND	ND	ND	ND	ND	1.9
Brand 7	ND	ND	ND	ND	0.42	2.23
Brand 8	ND	ND	ND	ND	0.4	2.45
Mean	--	--	--	--	-	3.58

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تقييم الجودة الكيماوية والميكروبيولوجية والحسية لبعض الجبن الرقفور الموجودة في الأسواق المصرية

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في هذه الدراسة تم جمع عدد ثماني عينات من الجبن المعرق بالفطر الأزرق من السوق المصرية سبع عينات مستوردة وعينة وحيدة منتجة في مصر , تم تقييم تلك العينات كيميائياً وميكروبيولوجياً وحسباً كما تم الكشف عن وجود بعض السموم الفطرية ودلت النتائج المتحصل عليها ان نسبة الحموضة ودرجة الحموضة تراوحت من (2.17 الي 2.57) و (4.95 الي 5.39) علي التوالي بينما تراوحت نسبة الدهن وقيم الدهن في المادة الجافة ما بين (29 الي 36) و (52.51 الي 64.96) علي الترتيب كما سجلت الرطوبة والمواد الصلبة الكلية في عينات الجبن مدي تراوح بين (39.44 الي 45.02) و (54.98 الي 60.56) علي التوالي وكانت متوسطات قيمها لكل عينات الجبن (2.27 , 5.18 , 4.43 , 10.41 , 35.50 , 42.56 , 57.44 , 56.58) علي الترتيب. وفيما يتعلق بالنيتروجين الذائب في الماء والنيتروجين الاميني فقد سجلت النتائج مدي تراوح بين (42.51 الي 50.48) بمتوسط 47.39 و (18.21 الي 22.00) بمتوسط 19.54 علي التوالي . وفيما يتعلق بنسبة البروتين الكلية ونسبته في المادة الجافة فقد سجلت نتائج التحليل مدي من القيم تراوح بين (18.66 الي 23.00) بمتوسط 20.82 و (31.22 الي 43.60) بمتوسط 37.09 علي الترتيب . كما بينت نتائج التحليل الكيميائي لتركيز كل من حمضي التيروسين والتريبتوفان مدي من التركيز بلغ (0.36 الي 0.44) بمتوسط بلغ 0.41 و (0.42 الي 0.55) بمتوسط بلغ 0.49 وقياس درجة التحلل الليبيدي فقد أظهرت نتائج التحليل درجة عالية من قيم كل من الأحماض الدهنية الحرة والأحماض الدهنية المتطايرة والتي تراوحت من (33.00 الي 70.00) بمتوسط 48.96 و (15.00 الي 42.00) بمتوسط بلغ 30.13 وأخيراً بلغ قيمة متوسط الرماد في عينات الجبن حوالي 4.42 . ودلت نتائج التحكيم الحسي أن مجموع النقاط الكلية التي حصلت عليها عينات الجبن قد تراوحت بين (75.52 الي 90.04) بمتوسط بلغ 83.79 نقطة . وفيما يتعلق بالجودة الميكروبية فقد دلت نتائج العد القياسي للاطباق أن الحمولة الميكروبية تراوحت ما بين ($10^5 \times 2.3$ الي $10^5 \times 18.5$) بمتوسط بلغ $10^5 \times 6.36$ أما عدد الفطريات والخمائر فقد بلغت مدي تراوح بين ($10^5 \times 14.5$ الي $10^5 \times 150.1$) بمتوسط بلغ $10^5 \times 59.51$ cfu/g⁵ . وفيما يتعلق بوجود بكتيريا القولون وكذا البكتيريا اللاهوائية المكونة للجراثيم فلم يتم إكتشاف وجود أي منها في جميع عينات الجبن المختبرة . وفيما يتعلق بالأمان الصحي فقد تم اختبار عينات الجبن لتواجد بعض السموم الفطرية وأظهرت الدراسة تواجد الرقفورتين سي في جميع عينات الجبن بمدي بلغ (1.9 الي 5.21) بمتوسط 3.58 . كذلك أكدت الدراسة احتواء عينات الجبن رقم 3, 7, 8 علي حمض البيبسيلك ولم يتم إكتشافه في باقي العينات , فيما أكدت الدراسة أن جميع العينات سواء المستوردة أو المحلية خلت تماماً من كل من الافلاتوكسين جي 1, إم 1, بي 1, بي 2 .