

(1) (1)

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Staphylococcus aureus

Acinetobacter Serratia Citrobacter freundii Escherichia coli

. *Enterobacter*

:

Study of Some Chemical and Microbial Properties in Syrian Chelal and Halloumi Cheeses

Samir Slik⁽¹⁾ and Sayah Abou Ghorra⁽¹⁾

ABSTRACT

This research was conducted in Agriculture College (Food Science Dep., Damascus University) during two years period (2003 – 2004). The purpose of this research was to evaluate Chelal and Halloumi cheeses in Syria by determination some chemical and microbial properties for 100 samples collected randomly from different Syrian cities and urban markets.

The results showed that 41% of samples were rejected by (Syrian Normal Standard) for total dry matter, and 92% of samples were also rejected for sodium chloride for both types of cheeses. However, 24% of Chelal samples were rejected for total count of coliform and there were no rejection for any another microbial count tested. There were 22 % of rejection in total Coliform count and 2% for *Escherichia coli* in Halloumi samples, but there were no rejection for existence of *Staphylococcus aureus* and *Salmonella* .

The dominant bacteria were, *Escherichia coli*, *Citrobacter freundii*, *Enterobacter*, *Acinetobacter* and *Serratia* .

Key words: Chelal and Halloumi cheese, Technology, Microbiology

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. (Fox 1993)

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%	
%55	- 1
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	³ 10	² 10	2	5	
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	² 10	10	2	5	<i>E.coli</i>
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	⁴ 10	³ 10	2	5	
	³ 10	² 10	1	5	
	³ 10	² 10	2	5	<i>E.coli</i>

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° 105
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Nutrient Agar

72 °31
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48 44.5 48 31 VRBA

E.coli ()

(*Staphylococcus aureus*)

Baird Parker (B.P.)

9.41	0.43	45.11	33.25	15		2
9.65	0.81	42.64	24.62	10.5		3
8.91	0.65	42.28	17.73	7.5		4
8.32	0.54	51.17	24.42	12.5		5
11.2	0.47	39.42	13.95	5.5		6
6.3	0.42	60.33	14.91	9		7
5.9	0.25	65	11.53	7.5		8
9.27	0.30	41.4	13.88	5.75		9
10.68	0.13	41.38	6.64	2.75		10
8.98	0.47	41.57	9.62	4		11
11.7	0.63	39.49	17.09	6.75		12
10.42	0.46	36.82	9.5	3.5		13
8.48	0.59	42.82	7.58	3.25		14
9.31	0.66	47.12	15.91	7.5		15
10.70	0.61	46.90	12.79	6		16
13.39	0.42	43.71	40.03	17.5		17
10.14	0.57	47.78	12.55	6		18
10.51	0.47	41.38	14.49	6		19
10.15	0.46	41.04	5.48	2.25		20
9.44	0.34	36.95	8.12	3		21

...(1)

11.04	0.57	38.84	18.02	7		22
8.60	0.28	55.23	32.59	18		23
12.72	0.39	52.40	20.99	11		24
10.23	0.46	41.90	13.12	5.5		25
8.92	0.45	54.58	43.97	24		26
8.83	0.5	55.68	39.96	22.25		27
4	0.31	62.66	3.98	2.5		28
3.5	0.21	68	13.97	9.5		29
4.5	0.24	65	16.92	11		30
5	0.12	60	16.66	10		31
6	0.29	68.5	16.05	11		32
7	0.27	68	16.91	11.5		33
10.5	0.21	67	12.68	8.5		34
8	0.21	66	15.15	10		35
6.4	0.24	68	16.91	11.5		36

7	0.13	62.5	16.8	10.5		37
5.5	0.16	61	11.47	7		38
7.5	0.28	68.6	13.11	9		39
5.9	0.23	63.8	11.75	7.5		40
7.5	0.25	67	11.94	8		41
6.7	0.12	65	13.84	9		42
7.5	0.36	71	10.56	7.5		43
8.1	0.14	64	15.62	10		44
4.5	0.20	66.5	18.04	12		45
4.8	0.21	69.5	15.82	11		46
6.3	0.14	61.5	13	8		47
5.3	0.10	63.8	13.32	8.5		48
7.5	0.21	69.7	11.47	8		49
6.9	0.32	62	14.51	9		50
8.16	0.36	54.83	16.55	9		

(2)

%	%	%	%	%		
9.25	0.31	42.09	19	8		1
8	0.49	43.66	13.74	6		2
8.28	0.63	38.64	18.11	7		3
7.75	0.36	49.60	43.34	21.5		4
9.17	0.67	45.43	18.71	8.5		5
9.9	0.62	41.19	14.56	6		6
8.1	0.4	45.28	19.87	9		7
5.72	0.51	41.36	10.88	4.5		8
5.83	0.61	55.14	46.69	25.75		9
5.84	0.42	41.24	13.33	5.5		10
5.54	0.54	44.55	22.44	10		11
5.59	0.63	42.78	22.79	9.75		12
5.26	0.7	52.72	35.56	18.75		13
10.5	0.35	45.70	13.12	6		14
4.6	0.26	70.2	11.39	8		15
9.9	0.57	43.23	19.66	8.5		16
8.86	0.28	39.82	13.81	5.5		17
6.60	0.24	58.63	35.81	21		18
9	0.5	43.07	23.21	10		19
9.03	0.33	47.31	10.56	5		20
10.27	0.5	47.58	24.16	11.5		21
10.91	0.49	46.59	23.07	10.75		22
7.63	0.59	50.08	33.44	16.75		23
9.3	0.61	42.17	18.97	8		24
9.5	0.5	43.26	21.96	9.5		25
5.85	0.26	36.01	23.60	8.5		26
4.1	0.31	69.8	15.75	11		27
3.5	0.36	65	18.46	12		28
5.5	0.22	65	13.84	9		29
4.9	0.14	70.5	14.18	10		30
5.7	0.23	68.5	16.05	11		31
6.5	0.15	70	14.28	10		32
7.4	0.23	62	19.35	12		33

...(2)

3.5	0.14	67.5	11.85	8		34
3.4	0.32	62.5	14.4	9		35
7.5	0.42	68.5	13.13	9		36
4.5	0.19	67.6	11.83	8		37
8.4	0.14	70	10.71	7.5		38
6.3	0.23	68	13.97	9.5		39
6.8	0.16	69	10.86	7.5		40
3.8	0.27	70.5	12.76	9		41
2.27	0.28	63	14.28	9		42
4.5	0.21	68	14.70	10		43
8.3	0.25	63	19.04	12		44
2.5	0.32	61	18.03	11		45
2.48	0.25	63	12.69	8		46
6.5	0.21	64	12.5	8		47
3.9	0.22	69	13.04	9		48
5	0.25	66	12.12	8		49
8	0.21	66	13.63	9		50
6.62	0.36	55.89	18.26	10		

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%10

% 9

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% 16.55

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%11

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.1993 Fox
%41
. %50
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% 0.6 % 0.36
-
6.62 %8.16
% %
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%92
%4

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(

SPSS

T.Test

One-sample Test

SPSS

(4)

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(3)

		1	1	<i>E.coli</i> 1	<i>S.aureus</i> 1	<i>Salmonella</i> 25
1		$^4 10 \times 2.95$	$^2 10 \times 2.1$		$^2 10 \times 2$	
2		$^3 10 \times 9$	$^2 10 \times 1.42$			
3		$^4 10 \times 1.5$				
4		$^4 10 \times 7$			$^2 10 \times 2.5$	
5		$^5 10 \times 1.4$			$^2 10 \times 3.5$	
6		$^3 10 \times 3.5$	10×9.5			
7		$^6 10 \times 2$	$^5 10 \times 4$			
8		$^6 10 \times 3$	$^5 10 \times 3.5$		10×2	
9		$^4 10 \times 1.25$	$^2 10 \times 1$			
10		$^5 10 \times 1.1$	10×5			
11		$^5 10 \times 2.6$	$^2 10 \times 1.1$	10×3		

12		$^2 10 \times 5.5$				
13		$^4 10 \times 1.9$				

...(3)

14		$^4 10 \times 4.15$				
15		$^3 10 \times 1.9$				
16		$^4 10 \times 6.7$				
17		$^5 10 \times 1.45$			10×5.5	
18		$^5 10 \times 1.55$				
19		$^4 10 \times 6.25$	$^2 10 \times 1.55$			
20		$^5 10 \times 5.65$	$^2 10 \times 1.6$			
21		$^3 10 \times 3$				
22		$^2 10 \times 4$				
23		$^5 10 \times 4.85$	$^2 10 \times 2$	10×4.1		
24		$^3 10 \times 3.55$				
25		$^4 10 \times 1.6$				
26		$^3 10 \times 3.32$				
27		$^3 10 \times 1.5$				
28		$^6 10 \times 8.1$	$^4 10 \times 5$			
29		$^6 10 \times 2.1$	$^4 10 \times 5.2$		10×1	
30		$^6 10 \times 4.1$	$^4 10 \times 4.3$			
31		$^6 10 \times 3.8$	$^4 10 \times 2.8$			
32		$^6 10 \times 4.4$	$^4 10 \times 6.6$		10×1	
33		$^5 10 \times 8.9$	$^3 10 \times 3.4$			
34		$^6 10 \times 3.9$	$^4 10 \times 4.5$			
35		$^5 10 \times 4.3$	$^3 10 \times 2$			
36		$^5 10 \times 8.5$	$^3 10 \times 2.5$			
37		$^6 10 \times 2.3$	$^4 10 \times 3.8$	10×3	10×2	
38		$^6 10 \times 7.8$	$^4 10 \times 4.2$			
39		$^5 10 \times 6.6$	$^3 10 \times 2.6$			
40		$^5 10 \times 7.6$	$^3 10 \times 3.1$			
41		$^5 10 \times 8.1$	$^3 10 \times 4.3$			
42		$^6 10 \times 3.5$	$^4 10 \times 6.1$			
43		$^5 10 \times 2.5$	$^3 10 \times 7.5$			
44		$^5 10 \times 4.6$	$^3 10 \times 6.4$		10×2	
45		$^3 10 \times 5.1$	$^2 10 \times 5.4$		10×1	
46		$^5 10 \times 7.6$	$^4 10 \times 3.3$	10×1		
47		$^3 10 \times 8.5$	$^2 10 \times 2.3$			

48		$^5 10 \times 3.6$	$^3 10 \times 6.1$			
49		$^5 10 \times 2.1$	$^3 10 \times 3.3$		10×1	
50		$^4 10 \times 5.4$	$^3 10 \times 2.8$		10×2	

(4)

		1	1	<i>E.coli</i> 1	<i>S.aureus</i> 1	<i>Salmonella</i> 25
1		$^4 10 \times 5.2$	$^2 10 \times 1.85$	$^2 10 \times 1.4$		
2		$^3 10 \times 2.95$	$^2 10 \times 5$	10×8.5		
3		$^4 10 \times 6.7$	$^2 10 \times 1.35$	$^2 10 \times 1.15$		
4		$^5 10 \times 6.6$	$^2 10 \times 6.75$	$^2 10 \times 2.5$		
5		$^5 10 \times 2.15$	$^2 10 \times 6.6$	$^2 10 \times 4.6$		
6		$^4 10 \times 8$				
7		$^5 10 \times 1.95$				
8		$^4 10 \times 2.6$	$^3 10 \times 1$	$^2 10 \times 4.75$		
9		$^5 10 \times 1.9$	$^3 10 \times 1.5$	10×5.5		
10		$^4 10 \times 4.76$				
11		$^3 10 \times 7.75$				
12		$^4 10 \times 2.05$	10×1			
13		$^4 10 \times 2.65$	10×3	10×2.4		
14		$^4 10 \times 5.5$	$^4 10 \times 2$	$^3 10 \times 1.5$		
15		$^6 10 \times 3.6$	$^4 10 \times 4$			
16		$^4 10 \times 5.3$	$^2 10 \times 9.5$	$^2 10 \times 1.5$		
17		$^4 10 \times 6.25$				
18		$^3 10 \times 1.8$				
19		$^5 10 \times 1.75$	10×2.5	10×1		
20		$^4 10 \times 5.3$	$^2 10 \times 1.05$	10×7.5		
21		$^4 10 \times 3.2$	$^2 10 \times 1.75$	10×1		
22		$^4 10 \times 1.95$	$^2 10 \times 2.5$			
23		$^3 10 \times 4.5$	10×4	10×2		
24		$^3 10 \times 5.45$				
25		$^5 10 \times 2.15$	10×3.5			
26		$^3 10 \times 4.5$	10×9	10×2.5		
27		$^6 10 \times 4.6$	$^5 10 \times 3$			
28		$^5 10 \times 5.5$	$^4 10 \times 4$			
29		$^5 10 \times 6.9$	$^4 10 \times 6.1$			

30		$^5 10 \times 9.5$	$^4 10 \times 2.3$			
31		$^5 10 \times 8.6$	$^4 10 \times 4.5$			
32		$^5 10 \times 3.9$	$^3 10 \times 3.3$			
33		$^5 10 \times 4.8$	$^3 10 \times 2.3$			

...(4)

34		$^5 10 \times 5.5$	$^4 10 \times 3.4$	10×3		
35		$^5 10 \times 8.9$	$^4 10 \times 8.1$	$^2 10 \times 1.3$	10×2	
36		$^5 10 \times 7.7$	$^4 10 \times 9.1$	10×5		
37		$^5 10 \times 4.9$	$^3 10 \times 8.2$		10×3	
38		$^5 10 \times 4.6$	$^4 10 \times 6.6$	10×5	10×4	
39		$^5 10 \times 5.9$	$^3 10 \times 4.8$	10×5		
40		$^5 10 \times 8.1$	$^3 10 \times 3.9$			
41		$^5 10 \times 3.9$	$^3 10 \times 9.1$			
42		$^4 10 \times 1.2$	$^2 10 \times 3$			
43		$^4 10 \times 1.3$	$^2 10 \times 1$			
44		$^3 10 \times 3.5$	10×1			
45		$^3 10 \times 3.3$	10×3			
46		$^4 10 \times 2$	10×4			
47		$^4 10 \times 1.5$	$^2 10 \times 2$			
48		$^4 10 \times 4$	$^2 10 \times 1.2$			
49		$^4 10 \times 3.3$	$^2 10 \times 4$	10×1.5		
50		$^4 10 \times 1.1$				

(4 3)

$^6 10 <$

$^5 10$

E.coli

Staphylococcus aureus

$^3 10$

$^2 10$

.

Staph.

E.coli

aureus

: (5)

(5)

		<i>E.coli</i>	<i>Staph. aureus</i>	<i>Salmonella</i>
	(12) %24			
	(11) %22	(1)%2		

%24

%22

E.coli

Staph. aureus

.(

%2)

²10

5.4

pH

°90 – 75

(Aw)

Escherichia

. *Serratia Acinetobacter Enterobacter*

Citrobacter freundii coli

Mstatc

()

.1
.2
) %90
%24) (%22
(%22
.3
%0.45
.4
%10
Escherichia coli
Staph)
.5
(.aureus

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