

ACCELERATION OF RAS"KEFALOTYRI" CHEESE RIPENING BY EMPLOYMENT OF CHEESE SLURRY

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ABSTRACT

Ras cheese was manufactured from standardized pasteurized buffaloes' milk. Slurry of fully ripened Ras cheese was added to cheese milk as well as cheese curd at different concentrations. Cheese samples were cured at 15°C and 85-90% relative humidity (RH) for 4 months, and analyzed for chemical, microbiological and organoleptic properties. Addition of cheese slurry to cheese curd resulted in an increase of yield, moisture, titratable acidity, soluble nitrogen, soluble nitrogen coefficient, total volatile fatty acids, formol ripening index, total viable count, proteolytic and lipolytic bacterial counts. Cheese samples containing slurry in cheese curd also achieved the highest scores for organoleptic properties which were correlated with the amount of slurry added. However, addition of cheese slurry to cheese milk prior to renneting resulted in no enhancement of the cheese ripening. It is recommended to employ 3% cheese slurry to be added to cheese curd in order to accelerate the ripening of Ras cheese made from buffaloes' milk.

INTRODUCTION

Ras (Kefalotyri) cheese as reported by Abdel Tawab and Hamdy (1967) and Scott (1981), has been always attracted the attention of the dairy scientists in Egypt, to direct their interests toward improvement of the quality of this type of hard cheese, due to its absolute local superior popularity. This is mainly due to its manufacturing simplicities and its characteristic pungent flavour that suits the Egyptian taste. It is well known that Ras cheese made from buffaloes' milk possesses undesirable characteristics as being harsh in texture and flat in flavour. An almost unending list of papers on ripening acceleration of Ras cheese, using different means of ripening agents, had been published (Hofi *et al.*, 1973; Abo El-Heba, 1976; Safinaze *et al.*, 1979; Abd El-Salam *et al.*, 1979; Abd El-Baky *et al.*, 1982; Mohamed, 1984; Hagrass *et al.*, 1984; Nadia Zaki, 1988, Mohamed *et al.*, 1989, El-Soda, 1990 a,b and c; and Mostafa *et al.*, 2000). However, the effect of the addition of cheese slurry to cheese milk for the enhancement of the ripening process was scarcely reported being still obscure. Therefore, the objective of the present work was to elucidate the effect of using different concentrations of cheese slurry for pre-ripening the milk prior to renneting comparing with its effect when being added to cheese curd, just before moulding and pressing, on the properties of the resultant cheese.

MATERIALS AND METHODS

Fresh buffaloes' milk obtained from the herd of the Faculty of Agriculture, Al-Azhar University was standardized to casein/fat ratio,

approximately 0.7 and pasteurized at 74°C for 15 sec. Chemical composition of the fully ripened Ras cheese used for slurry preparation obtained from the experimental unit of the dairy department was as follows: Moisture % 31.3, acidity % 2.1, fat/DM % 52.3, salt/water % 14.6, TN/DM % 7.44, SN/DM % 1.54 and pH 5.6. Cheese slurry was prepared immediately before its employment as follows: Two parts of the fully ripened Ras cheese were blended with one part of pasteurized milk plus 0.5% K-sorbate at 45°C for 1 to 2 min until good homogeneous was obtained (Mostafa *et al.*, 2000). Thermolabile microbial rennet from *Mucor miehei* (Gist Brocades, France) was used for renneting (0.03 g/kg). Yogurt starter of *Str. salivarius subsp. thermophilus* and *L. delbrueckii subsp. bulgaricus* (1:1), purchased from Chr. Hansen laboratory, Copenhagen, Denmark, was used for culturing the cheese milk. A fine salt was employed for cheese salting. Cheeses were analysed bacteriologically and chemically when fresh (after salting process) and then every month for 4 months. Total viable count, proteolytic and lipolytic bacterial counts were detected as mentioned in American Public Health Association (1985). The cheese yield was calculated as kg.cheese / kg.milk + slurry. Whereas, moisture, titratable acidity (as lactic acid), pH, fat, salt, total and soluble nitrogen were estimated according to Ling (1963). Total volatile fatty acids were carried out according to Kosikowski (1978). Formol ripening index was determined as described by Tawab and Hofi (1966).

Cheese manufacture:

Seven batches, each of 10 kg standardized (casein / fat ratio about 0.7) pasteurized (74°C/15 sec.) buffaloes' milk were inoculated with 1% of yogurt starter culture, 30 min before renneting for milk ripening at 32 °C. The batches were treated as follows: To milk in batches 1 and 2; 1 and 2% cheese slurry (w:w), were added respectively, before renneting (0.03g/kg), and processed into Ras cheese as the procedures followed by Abd El-Tawab and Hamdy (1967). Batches 3 and 4, converted to cheese curd which were then treated with 2 and 3% cheese slurry (w:w, curd: slurry), and processed into Ras cheese. To milk in batches 5 and 6, 1 and 2% cheese slurry (w:w), were added, respectively, before renneting and converted to cheese curd which were treated then with 2 and 3% cheese slurry, respectively, (w:w), and processed into Ras cheese. The 7th batch contained no cheese slurry and was made into Ras cheese as afore-mentioned method and served as control. After complete coagulation (45 - 60 min at 32°C), the coagulum was cut. Curd-scalding was carried out at 42 - 45°C for 20 - 30 min, then 2% salt (w:w, milk: salt) was added as a pre-salting process for 10 - 15 min. This presalting process also helps to reduce the calcium and organic P content of the Ca-paracaseinate-phosphate complex and improves the quality of buffaloes milk hard cheese (Moneib and El-Gazzar, 1970) . Cheese curds were ladled into moulds lined with cheese cloth. After 5 - 10 min., cheese curds were treated with 40 and 60g slurry (2 and 3%), respectively, per 2 kg cheese curd. The cheeses were pressed for 24 hrs. and turned over several times during this period. Dry salting was applied on the surfaces of the cheeses by rubbing with about 60 g. of a fine salt each other day, for 6 days.

The cheeses were turned over every day for another 9 days, then coated with wax, and stored for ripening at 15°C and 85 - 90% RH for 4 months. Cheeses were judged organoleptically, every month till the end of ripening of 4 months. The proposed scoring table of Nelson and Trout (1956) was followed. Flavour (out of 40 points), body & texture (out of 40 points), salting (out of 10 points), colour and general appearance (out of 5 points for each). The judgement was carried out by at least 6 staff members of the dairy department. The whole experiment was repeated for reproducibility and the presented data are the mean values.

RESULTS AND DISCUSSION

Chemical composition:

Data obtained in Table (1) indicated that cheese containing slurry, before salting, resulted in higher yield of 1 -3.5% than the control. This increase in yield was associated with the amount of slurry added, and was more apparently in treatments 3, 4, 5, and 6 than 1, and 2. Addition of slurry probably caused higher acidity of treated cheeses which affected the physical structure of the curd and increased its water holding capacity (Table, 2), as advocated by El-Koussy (1966) and Asker *et al.* (1982). After salting, the yield dropped in all treatments, probably due to water loss, which continued as cheese ripening extended to 4 months, but with comparatively lower rate. However, cheeses containing slurry remained with higher yield than the control of 1.1, 1.7, 1.5, and 1.8% for treatments 3, 4, 5, and 6, respectively.

Table (1): Cheese yield % as affected by slurry added throughout storage at 15°C and 85-90% relative humidity (RH) for 4 months.

Storage period (month)	Treatment (T)*						
	Control	1	2	3	4	5	6
Before salting	13.7	14.2	15.0	15.8	16.4	16.4	16.7
After salting	12.0	12.4	13.3	13.7	14.4	15.0	14.7
1	11.4	11.5	11.9	12.8	13.4	13.1	13.5
2	10.9	11.0	11.4	12.3	13.0	12.6	12.9
3	10.5	10.6	10.9	11.8	12.5	11.9	12.2
4	10.2	10.2	10.4	11.3	11.9	11.7	12.0

* Treatments: 1 and 2, contained 1 and 2% cheese slurry, respectively, added to cheese milk prior to renneting (w:w).

- 3 and 4, contained 2 and 3% cheese slurry, respectively, added to cheese curd (w:w).

- 5 and 6, contained 1 and 2% cheese slurry added to cheese milk plus 2 and 3% cheese slurry added to cheese curd (w:w), respectively.

Control: Contained no cheese slurry.

Cheese yield = Kg cheese / kg milk + slurry

Table (2): Effect of slurry added on chemical composition of Ras cheese ripened for 4 months at 15°C and 84-90% RH.

Ripening period (month)	Treatments (T)*						
	Control	1	2	3	4	5	6
	Moisture %						
Fresh	38.3	39.0	40.4	40.9	41.5	41.7	42.3
1	34.3	34.6	35.7	37.3	37.8	37.0	38.4
2	32.8	33.1	34.2	35.8	36.7	35.5	36.7
3	31.8	31.9	32.7	34.4	35.3	33.6	34.7
4	30.4	30.7	31.2	32.9	33.6	33.0	34.1
	Acidity % (as lactic acid)						
Fresh	0.94	1.19	1.25	1.65	1.78	1.75	1.84
1	1.25	1.40	1.46	2.03	2.21	2.05	2.25
2	1.51	1.59	1.70	2.22	2.38	2.27	2.40
3	1.72	1.81	1.87	2.25	2.45	2.36	2.47
4	1.87	1.93	1.98	2.30	2.56	2.36	2.57
	pH						
Fresh	5.5	5.4	5.4	5.0	4.9	4.9	4.9
1	5.4	5.4	5.3	4.9	4.8	4.9	4.8
2	5.3	5.3	5.2	4.9	4.9	4.9	4.9
3	5.0	5.1	5.2	5.3	5.3	5.3	5.3
4	5.2	5.2	5.2	5.4	5.5	5.4	5.5
	Fat %						
Fresh	32.1	32.4	32.0	31.3	31.6	31.2	31.2
1	34.1	34.7	34.4	32.9	33.2	33.5	33.1
2	34.7	34.8	34.7	33.6	33.7	33.9	33.7
3	35.0	35.7	35.4	34.1	34.3	34.7	34.8
4	35.9	36.1	36.3	34.8	35.2	34.9	34.7
	Fat / D.M.%						
Fresh	52.1	53.1	53.7	52.9	54.0	53.5	54.1
1	51.9	53.0	53.5	52.5	53.3	53.1	53.7
2	51.7	52.0	52.7	52.4	53.2	52.6	53.2
3	51.2	52.4	52.6	52.0	53.0	52.2	53.1
4	51.6	52.1	52.7	51.8	53.0	52.1	52.7
	Salt %						
Fresh	2.69	2.85	2.99	2.93	2.99	3.06	3.15
1	3.02	3.15	3.32	3.28	3.36	3.37	3.61
2	3.12	3.21	3.39	3.47	3.56	3.48	3.67
3	3.29	3.41	3.53	3.61	3.70	3.63	3.78
4	3.40	3.47	3.56	3.72	3.80	3.76	3.92
	Salt / water %						
Fresh	7.02	7.31	7.40	7.16	7.21	7.35	7.45
1	8.80	9.10	9.30	8.80	8.90	9.10	9.40
2	9.50	9.70	9.90	9.70	9.70	9.80	10.0
3	10.4	10.7	10.8	10.5	10.5	10.8	10.9
4	11.2	11.3	11.4	11.3	11.3	11.4	11.5
	T.N. %						
Fresh	4.55	4.54	4.47	4.46	4.44	4.41	4.39
1	4.93	4.95	4.89	4.78	4.78	4.82	4.74
2	5.09	5.12	5.09	4.94	4.90	4.98	4.92
3	5.20	5.28	5.26	5.09	5.03	5.17	5.09
4	5.32	5.42	5.42	5.23	5.21	5.23	5.19

(Table 2) cont

Fresh	T.N. / D.M. %						
	7.38	7.45	7.50	7.55	7.59	7.57	7.61
1	7.50	7.57	7.61	7.63	7.65	7.65	7.70
2	7.58	7.66	7.73	7.70	7.74	7.72	7.78
3	7.60	7.75	7.81	7.76	7.77	7.79	7.80
4	7.65	7.82	7.88	7.80	7.85	7.82	7.88

* Treatments: 1 and 2, contained 1 and 2% cheese slurry, respectively, added to cheese milk prior to renneting (w:w).

- 3 and 4, contained 2 and 3% cheese slurry, respectively, added to cheese curd (w:w).

- 5 and 6, contained 1 and 2% cheese slurry added to cheese milk plus 2 and 3% cheese slurry added to cheese curd (w:w), respectively.

Control: Contained no cheese slurry.

Fresh cheese: Cheese after salting process.

T.N.: Total nitrogen.

D.M.: Dry matter.

Table (2) revealed that fresh cheeses containing slurry had higher moisture content than the control. Although all treatments showed decrease in moisture as ripening proceeded probably due to evaporation, however, after 4 months of storage, treated cheeses were remained with higher moisture than the control. It should be emphasized that the relatively higher moisture of the treated cheeses improved body & texture as well as the flavour of these cheeses (Table, 5). Table (2), also indicated that titrat able acidity was higher in fresh treated cheeses than the control, which increased gradually, in all treatments, during ripening. However, cheeses containing slurry added to cheese curd characterized with higher acidity than those containing slurry added to cheese milk. The pH values in Table (2) decreased as ripening prolonged, however, as the maturity of cheeses advanced, the pH increased. The decrease in pH during the first stages of ripening is due to the formation of lactic acid and acidic compounds, while the increase in pH when ripening progressed, may be attributed to the formation of basic compounds (Shendy, 1989). The presented data in Table (2), also indicated that fresh treated cheeses contained slightly higher values of fat/DM%, salt/water%, and TN/DM% than the control, which might be ascribed to the addition of these compounds in the slurry added. As ripening prolonged, salt/water ratio increased gradually, this was associated with the corresponding water loss due to evaporation. The same trend was observed for fat% and TN%, however, fat/DM showed slightly decrease, in all treatments, with extended ripening, which might be due to the depletion of the fat of some of the free volatile fatty acids during the determination (El-Koussy, 1966 and Abo El-Heba, 1976).

Ripening indices:

Table (3) showed that cheese ripening indices either resulted from protein decomposition (SN%, SN/DM%, SN/TN% and formol number), or fat hydrolysis (T.V.F.A) were apparently higher in cheeses containing slurry added to cheese curd than the control and/or cheeses containing slurry added to cheese milk, either when fresh or throughout ripening. This might be attributed to higher proteolytic and lipolytic bacterial counts in the former

cheeses than the latter one (Table, 4), which caused higher proteolysis and lipolysis, respectively (Abdel-Baky *et al.*, 1986, Ammar *et al.*, 1994 and Fayed *et al.*, 2002). Abdel Baky *et al.* (1982) and Mostafa *et al.*, (2000) reported that proteolytic and lipolytic microbial enzymes in the slurry enhanced the development of ripening indices of the treated cheeses.

Table (3): Ripening indices of Ras cheese as affected by slurry added when fresh and during curing period for 4 months at 15°C and 85-90% RH.

Curing period (month)	Treatment (T) ^a						
	Control	1	2	3	4	5	6
Fresh [#]	0.20	0.21	0.22	0.24	0.29	0.25	0.28
1	0.27	0.29	0.28	0.39	0.10	0.42	0.42
2	0.38	0.38	0.38	0.38	0.48	0.50	0.51
3	0.49	0.52	0.52	0.58	0.63	0.59	0.67
4	0.64	0.68	0.68	0.76	0.84	0.78	0.86
	S.N. / D.M. %						
Fresh	0.33	0.35	0.37	0.41	0.50	0.43	0.48
1	0.41	0.44	0.45	0.62	0.65	0.66	0.68
2	0.56	0.57	0.58	0.75	0.79	0.80	0.80
3	0.72	0.76	0.77	0.88	0.97	0.89	1.02
4	0.92	0.98	0.99	1.14	0.27	1.18	1.30
	S.N. / T.N. %						
Fresh	4.40	4.62	4.92	5.38	8.53	5.67	6.38
1	5.47	5.85	5.73	8.16	8.40	8.71	9.40
2	7.47	7.42	7.47	9.72	10.2	10.4	10.4
3	9.42	9.85	9.89	11.4	12.5	11.4	13.2
4	12.0	12.5	12.5	14.5	16.1	14.9	16.6
	Formol number						
Fresh	24.3	30.1	35.0	38.6	43.8	38.4	42.0
1	38.1	42.1	45.1	66.1	70.1	67.7	71.0
2	57.1	60.2	62.8	95.3	104	99.1	105
3	70.7	73.0	77.3	120	129	122	131
4	84.2	88.0	92.8	127	145	128	147
	T.V.F.A.						
Fresh	13.4	13.3	14.0	14.5	15.2	14.2	14.4
1	15.1	15.2	15.6	16.6	17.1	17.0	18.8
2	19.4	19.5	20.1	21.3	23.6	21.8	24.7
3	20.6	21.0	21.7	25.7	28.8	26.1	29.0
4	19.5	20.3	20.8	26.8	30.7	27.1	31.0

^a Treatments: 1 and 2, contained 1 and 2% cheese slurry, respectively, added to cheese milk prior to renneting (w:w).

- 3 and 4, contained 2 and 3% cheese slurry, respectively, added to cheese curd (w:w).

- 5 and 6, contained 1 and 2% cheese slurry added to cheese milk plus 2 and 3% cheese slurry added to cheese curd (w:w), respectively.

Control: Contained no cheese slurry.

[#] Fresh cheese: Cheese after salting process.

T.V.F.A.: Total Volatile Fatty Acids (ml. 0.1N NaOH/100g cheese).

S.N.: Soluble nitrogen. D.M.: Dry matter.

Table (4): Bacteriological quality per 1g of Ras cheese made with cheese slurry and ripened for 4 months at 15°C and 85-90% RH.

Ripening period (month)	Treatment (T)*						
	Control	1	2	3	4	5	6
	Total viable count x 10⁶ (cfu/g)						
Fresh [#]	22	23	24	27	30	29	31
1	11	12	13	17	20	19	20
2	6.0	6.3	7.0	11	14	13	15
3	3.0	4.0	4.8	9.0	12	11	12
4	2.2	2.6	2.9	6.5	9.0	8.0	9.0
	Proteolytic bacterial count x 10⁴ (cfu/g)						
Fresh	6.0	6.0	6.6	12	15	13	15
1	8.0	8.5	8.9	15	18	16	19
2	9.0	10	10	18	21	19	22
3	13	13	14	24	30	25	31
4	17	18	20	33	39	34	40
	Lipolytic bacterial count x 10³ (cfu/g)						
Fresh	6.5	6.7	7.4	14	15	14	16
1	11	12	13	22	24	23	24
2	14	14	15	26	28	27	29
3	17	18	18	29	31	30	31
4	15	16	17	30	33	31	33

* Treatments: 1 and 2, contained 1 and 2% cheese slurry, respectively, added to cheese milk prior to renneting (w:w).

- 3 and 4, contained 2 and 3% cheese slurry, respectively, added to cheese curd (w:w).

- 5 and 6, contained 1 and 2% cheese slurry added to cheese milk plus 2 and 3% cheese slurry added to cheese curd (w:w), respectively.

Control: Contained no cheese slurry.

Fresh cheese: Cheese after salting process.

The functions and importance of the proteolytic enzymes on protein decomposition were reported by El-Sissi *et al.*, (1982). It should be emphasized that results in Table (3), were associated in an ascending order with the amount of slurry added to cheese curd. T4 and T6 possessed the highest figures of ripening indices followed by T3 and T5. However, no pronounced differences in ripening indices values were observed between T3 and T5, or T4 and T6.

Bacteriological quality:

Table (4) demonstrated that the addition of slurry had a relatively higher stimulatory effect on total viable count (T.C.), as well as, proteolytic and lipolytic bacterial counts (P.B.C. and L.B.C.) of fresh cheeses containing slurry added to cheese curd (treatments 3, 4, 5, and 6), than cheeses containing slurry added to cheese milk(1 and 2). Simultaneously, microbial counts were correlated with slurry concentration in cheese curd. The control cheese had, comparatively, lower T.C., P.B.C., and L.B.C. than cheeses containing slurry added to cheese curd.

Table (5): Effect of slurry added on sensory evaluation of Ras cheese during storage at 15°C and 85-90 % RH for 4 months.

Cheese age (month)	Scores	Treatment (T)*						
		Control	1	2	3	4	5	6
1	F	15	15	16	20	20	21	20
	B&T	20	20	20	21	25	20	23
	S	7	7	7	7	7	7	8
	C	4	4	4	4	4	4	4
	A	4	4	4	4	4	4	4
	TS	50	50	51	56	60	56	59
2	F	20	21	22	28	30	28	30
	B&T	24	24	25	29	30	30	29
	S	7	7	7	8	8	8	9
	C	4	4	4	4	4	4	4
	A	4	4	4	4	4	4	4
	TS	59	60	62	73	76	74	76
3	F	25	25	27	33	33	33	35
	B&T	26	26	27	34	36	34	36
	S	7	8	8	8	9	8	10
	C	4	4	4	4	4	4	4
	A	4	4	4	4	4	4	4
	TS	66	67	70	83	86	83	87
4	F	26	27	28	34	37	35	37
	B&T	28	28	29	35	37	35	37
	S	7	8	8	8	9	8	10
	C	4	4	4	4	4	4	4
	A	4	4	4	4	4	4	4
	TS	71	71	73	85	91	86	92

* Treatments: 1 and 2, contained 1 and 2% cheese slurry, respectively, added to cheese milk prior to renneting (w:w).
 - 3 and 4, contained 2 and 3% cheese slurry, respectively, added to cheese curd (w:w).
 - 5 and 6, contained 1 and 2% cheese slurry added to cheese milk plus 2 and 3% cheese slurry added to cheese curd (w:w), respectively.

Control: Contained no cheese slurry.
 F : Flavour (out of 40 points).
 B&T: Body & texture (out of 40 points).
 S : Salting (out of 10 points).
 C : Colour (out of 5 points).
 A : Appearance (out of 5 points).
 TS : Total scores (out of 100 points).

The stimulatory effect of slurry on microbial growth was reported by Dulley (1976), Abd El-Baky *et al.* (1982), Ammar *et al.* (1994), El-Sissi (1997), Mostafa *et al.* (2000) and El-Sissi (2002 a and b). During ripening, T.C. gradually decreased for all treatments, reaching its minimum values after 4 months of storage. These results were in agreement with those reported by Aly *et al.* (1990), Mostafa *et al.* (2000) and El-Shabrawy *et al.* (2002). Data given in Table (4) also revealed that there was a gradual increase in P.B.C. till 4 months of ripening for all treatments. The L.B.C. gradually increased

following the same trend as P.B.C. for treatments 3, 4, 5, and 6. However, T1 and T2 as well as the control showed its decrease for L.B.C. after 3 months. The increase and/or decrease in microbial counts in cheeses throughout the ripening might be due to the corresponding changes in the pH and the acidity (Table 2) as advocated by El-Erian (1969).

Sensory evaluation:

Table (5) indicated that the addition of cheese slurry to cheese curd either of T3 and T4, or T5 and T6, had a pronounced effect on the improvement of the organoleptic properties (body & texture and flavour) of the resultant Ras cheeses, compared with the control, which was apparently correlated with the amount of slurry added. However, the addition of slurry to cheese milk prior to renneting had no pronounced effect on ripening enhancement, since T1 and T2 obtained similar sensory scores as that gained in the control. It is obviously clear that the addition of the slurry to cheese milk of T5 and T6 resulted in no extra ripening acceleration, than had already recorded for treatments containing slurry added to cheese curd (T3 and T4). This implies that the addition of slurry to stimulate ripening acceleration of Ras cheese, showed its effect only when added to cheese curd and not to cheese milk. Cheeses of T1 and T2 as well as the control, showed harsh body & texture and flat flavour after one month of curing, however, slowly developed flavour was observed gradually, as ripening proceeded. Cheeses of T3 and T5 exhibited smoother body & texture as well as faster developed flavour than control, T1, and T2, beyond 2 months of ripening. Whereas, T4 and T6 gained the highest scores throughout storage, and evaluated as springy body & texture, and slightly developed flavour after one month of ripening. However, T4 and T6 exhibited smooth body & texture, and fully ripened flavour after 4 months of ripening. It should be emphasized that, since no pronounced differences in sensory scores between T4 and T6 were recorded, it is recommended to apply 3% cheese slurry to be added to cheese curd for the acceleration of ripening of Ras cheese made from buffaloes' milk.

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اسراع تسوية الجبن الراس باستخدام معلق الجبن

محسن جمال الدين السيسى

قسم الالبان - كلية الزراعة - جامعة الازهر

- تم تصنيع الجبن الراس من لبن جاموسي معدل مبستر، وتم اضافة معلق الجبن بتركيزات مختلفة للبن المعد للتفيح كذلك الخثرة الرطبة قبل الكبس، و خزن الجبن للتسوية على درجة 4°م و رطوبة 77% - 78% لمدة اربعة اشهر و تم تحليل الجبن على فترات كيميائيا و بكتريولوجيا و تحكيمه حسباً.
- ادى اضافة المعلق الى خثرة الجبن قبل الكبس الى زيادة كل من التصافي - الرطوبة - الحموضة - النيتروجين الذائب - معامل النيتروجين الذائب - رقم الفورمول- الاحماض الدهنية الكلية للطيارة - العدد الحيوى الكلى - البكتريا المحللة للبروتين و البكتريا المحللة للدهون.
- حصل الجبن الناتج من اضافة المعلق الى خثرة الجبن الرطبة قبل الكبس على اعلى درجات للتقييم الحسي التى اظهرت ارتفاعا بزيادة كمية المعلق المضاف.
- لم يودى اضافة معلق الجبن بتركيزاته المختلفة الى اللبن المعد للتفيح الى حدوث زيادة ملحوظة فى اسراع تسوية الجبن الناتج.
- يوصى بامضافة نسبة 2% من معلق الجبن الى خثرة الجبن الرطبة قبل الكبس كحافز لاسراع تسوية الجبن الراس المصنع من اللبن الجاموسى.