

## **STUDIES ON FRENCH SOFT GOAT'S MILK CHEESE:**

### **1- EFFECT OF TYPE OF PRESERVATIVES ON THE KEEPING QUALITY OF THE PYRAMIDS-LIKE CHEESE**

Zin El.Din, M.M.\*; E.S. El Sokkary\*\*; Y.I. ABdel Kader\*\*\* and Mona M. El Sadeek\*\*\*\*

\* Faculty of Tourism and Hotels, Mansoura Univ.

\*\* Dairy Department, Faculty of Agriculture, Mansoura Univ.

\*\*\* Dokki.Cairo. Animal Production Research Institute (APRI)

\*\*\*\*Extension Service Dept., Ministry of Agriculture.

### **ABSTRACT**

Pyramids-like cheese was made from goat's milk having 13.51% TS, 4.10% Protein, 4.30% Fat and 0.18% acidity and using 0.5% yoghurt as a starter. Three types of preservatives were applied to study their inhibitory effect on the growth of yeasts and moulds on the surface of the cheese. A control without preservatives addition is regarded as a control (P<sub>1</sub>) to the second treatment 0.1% K- Sorbate solution was added to the curd (P<sub>2</sub>). Similarly to the third and fourth treatment, 0.03% Na-Benzoate and an admixture of both preservatives (1:1) solutions were added to the third and fourth treatments (P<sub>3</sub>) and (P<sub>4</sub>) respectively. The resultant pyramids-like cheese were stored at 6±2°C for four weeks. Results showed that the addition of preservatives to the curd cheese before hopping, decreased the acidity of strained whey and resultant cheese. The lowest was for K-Sorbate treatment and the highest was for control treatment. Na- Benzoate addition led to slight higher yield. The addition of preservatives highly decreased the SN and NPN of the resultant cheese. The addition of different preservatives to the cheese curd markedly decreased the total bacteria count (TC) and lactic acid bacteria (LAB), the strongest effect for K-Sorbate followed by the admixture preservative (P<sub>4</sub>) and the lowest effect was for Na-Benzoate. No M&Y appeared in K-Sorbate cheese after four weeks, while they appeared after two weeks on Na-Benzoate cheese treatment. The admixture preservatives showed the colonies of M&Y at the fourth week. Use K-Sorbate as a preservative to inhibit the growth of M&Y was recommended.

**Keywords:** Pyramids cheese, Potassium sorbate, Sodium benzoate.

### **INTRODUCTION**

Pyramids cheeses is one of the most popular French soft goat's milk cheese known in France (Le Jaouen, 1987). Although the basic cheese making procedures are similar for many goat's cheese producing countries, numerous different varieties of Caprine cheese can be due to the variation in the composition of milk modification of manufacturing procedures, and multitude of aging time and conditions (Godina. 1985, Loewenstein, Speck, Barmhart and Frank. 1980, Park 1990). Poligny Saint Pierre and Valancay are cheeses having the shape of truncated pyramids shape. The traditional farmstead goat's milk cheese making consists of the following nine basic steps (Le Jaouen, 1987) (i)it must be free of any visible impurities. (ii)it must not present any abnormal taste or odor. (iii)its acidity must be in the vicinity of or only slightly higher than that of milking time, unless it has been subject to a ripening period in which the lactic acid producing bacteria have been allowed a period of time to acidity the milk. (v)the naturally occurring lactic acid

producing bacteria and yeasts or the cheese starter culture bacteria that can be added to the milk must be able to survive and reproduce to the proper number in the milk. (iv) the milk must contain no foreign substances such as antibiotics, antiseptics, cleaning products, and so on ; and (iiv) the milk must not be contaminated by either pathogenic micro-organisms or by microorganisms that may prove undesirable for the production of cheese. These procedures are traditionally used for French soft body type farmstead goat cheese manufacture (Park.W. and George F.W. Haenlein 2006). Production of high quality cheese can be achieved only when the final marketed products are free of flavor and texture defects as well as free of harmful micro-organisms. Proper pasteurization, proper cheese making, and ripening technique led to the production of high quality cheese. Flavor defects are identified as ransid, acid, bitler, goaty. Feedy, oxidized, cooked, brothy, or yeasty flavor (Holsinger et al, 1982 and Park et al 2005). Two stories about the truncated pyramids shape. First, Napoleon returned from his disastrous campaign in Egypt, he stopped at the castle of Valancay and reeing the cheese reminded him of the Egyptian pyramids. He drew his sword and chopped off the top. Cheeses have been made in the shape of a truncated pyramids ever since. The second story is told the farmers wanted to copy the steeple of village church this type of cheese left in a well ventilated room with a high humidity for three weeks. As the cheese ripens it develops a natural blue coloration. It is well known that French pyramids-like cheese is highly accepted in France when the moulds are heavily covering its surfaces. On the other hand, the spores of the blue fungi sometimes are added to the curd or the milk to have heavy and regular blue growth on the surface of the cheese. In Egypt, the growth of fungi on the surface of the cheese is completely refused and regarded as rotten foods. The aim of this part of investigation is to try the use of K-Sorbate, Na-Benzoate or a mixture of them to inhibit the growth of yeast and moulds on the surface of the pyramids-like cheese to suit the desire and taste of Egyptian consumers.

## **MATERIAL AND METHODS**

Goat's milk used during this study was obtained from El Zaraibi Goat's and Frisian herds kept at El-Serw Animal Production Research Station of Ministry of Agriculture Governorate of Domiatta.

Composed of *Streptococcus salivarius sub sp. thrmophilus* and *lactobacillus delbruckii sub sp bulgaricus* were separately activated by culturing in 11% sterilized reconstituted skim milk. They were added to cheese milk separately at rate of 0.5% for each.

Very diluted commercial animal liquid rennet was used for milk coagulation within 16 hours. The rennet was brought from local market. Clean food grade cooking salt was bought from El-Nasr Company, Alexandria.

Potassium sorbate and Sodium Benzoate food grade type were brought from El Gomhoria Chemical Company, Cairo French pyramids cheese was made as described by (Le Jaouen ,1977)and modified as follows:

This type of cheese is acidic-enzyme coagulation. Raw goat's milk containing 4.3% fat was filtrated through mouslin cloth then heated to  $63^{\circ}\text{C}\pm 1$  for 30 minutes, then cooled to  $32^{\circ}\text{C}\pm 1$ . Diluted rennet (0.005 normal) and 0.5% starter were added to milk to obtain soft curd in 14-16 hours. The soft curd was gently transferred to a clean mouslin cloth for wheying off. Without using any press 4-6 hours are required for complete wheying. The curd were filled into special plastic pyramids moulds. After 24 hours the cheese were removed another clean moulds, they were removed from the moulds, and placed on wooden table then, dry salting was carried out by sprinkling 1% dry salt on the surface of the cheese twice in two days. Salted cheese was stored at  $6\pm 2^{\circ}\text{C}$  and 85% relative humidity for four weeks for complete ripening.

40 kgs of goat's milk were heated to  $63\pm 1^{\circ}\text{C}$  for 30 minutes, cooled to  $32\pm 1^{\circ}\text{C}$ , 0.5% cheese starter were added followed by the addition of weak rennet, then the milk immediately divided into 4 equal portion and left individually to curdle in 14-16 hours. each portion of curd was individually transferred into plastic strain coated with mouslin to filtrate.

- After complete curdling preservatives were added to the curd.
- No preservative was added to the first portion  $P_1$  which is regarded as control.
- To the second portion 0.1% K-sorbate were added and well mixed. ( $P_2$ ).
- To the third portion 0.03% Na-Benzate were added and also well mixed ( $P_3$ ).
- To the fourth portion an admixture of both preservatives (1:1) forming 0.065% were added and thoroughly mixed ( $P_4$ ).
- The preservative lasted into the curd for 30 minutes before transferring to the coated mouslin strain.
- After complete filtration (4-6 hours) the soft curd portion were filled individually into pyramids moulds and left 24 hours to complete wheying off and to have their pyramids shapes.
- After salting, the cheese were kept at  $6\pm 2^{\circ}\text{C}$  for four weeks.
- Samples were regularly taken for chemical, microbiological and sensory evaluation analysis.
- Daily observation to record the growth of the yeasts and moulds on the surface the cheese through the storage time for four weeks.

Pyramids cheese samples were taken from the middle of the cheese after removing the top and the base layers for chemical and microbiological analysis, while samples for scoring of the cheese were done by slicing one cheese from head to the bottom and gave to the panelists. Samples of pyramids cheese were taken fresh, one, two, three and four weeks old for chemical and microbiological analysis. Parallely samples were taken for organoleptic analysis.

The total solid content was determined according to the British Standard Institution as described by (B-S-I-No.770,1952). Fat content: The conventional Gerber's methods was followed using the special butyrometer for cheese (B-S-I-No.770,1952). Titrable acidity of cheese was estimated as lactic acid % according to (Ling,1963). pH value: It was measured directly in the milk and whey using a digital pH meter while for cheese 10 gms of cheese were mixed with 10mL warm water to make an emulsion before immersing the electrode.

Salt content: The modified Volhard's method as described by (Kosikowski, 1970) was used to determine the salt content in cheese samples. TVFA in cheese was determined by direct distillation method according to (Kosikowski, 1978).

Sodium citrate cheese extracted was prepared as described by (Vakaleris & Price, 1959). From this extract an aliquate was taken for the determination of total nitrogen (T.N) by microkjeldahl method. Another aliquate was precipitated at pH 4.4 with HCl, the mixture is taken filtered through Wattman paper No.42, a clear sodium citrate hydrochloric filtrate was taken for the determination of soluble nitrogen (S.N) by microkjeldahl method. An aliquate of pH 4.4 filtrate (10 ml) was mixed with 12% T.C.A., to precipitate the protein, then filtered through Wattman No. 42 filter paper, Non protein nitrogen (N.P.N) was determined by the microkjeldahl method according to (Ling, 1963).

Total count according to Difco Manual, enumeration of certain lactic acid bacteria using MRS medium according to Difco Manual (1971). Coliform bacteria count according to standard methods for the examination of milk and dairy products. The determination of moulds and yeasts count using Potato Dextrose Agar according to Difco (1971).

Taste panel of 10 persons evaluated the organoleptic properties of cheese samples the panelists scored the cheese for flavor (out of 60 points), body and texture (30 minutes) and color and appearance (10 points) as described by (El-Sheikh et al, 2001).

## **RESULTS AND DISCUSSION**

The chemical composition of the different whey extracted from the four treatments were shown in Table (1).

The addition of different preservatives to the curd did not markedly affect on the TS, Fat, and protein contents of the drained whey. It had marked effect on decreasing the acidity of the whey, being 0.52% for control and 0.37, 0.45 and 0.41% for P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively. It seems that preservatives partly affected the activity of starter, the highest effect was for 0.1% K-sorbate (P<sub>2</sub>) followed by the admixture of both preservatives (P<sub>4</sub>). While the lowest was for Na-Benzoate (P<sub>3</sub>). Total solids of the whey ranged between 4.55 and 4.65% and The protein found in the whey ranged between 0.84 and 0.86%, this amount is less than whey protein found in goat's milk. This is may be due to the precipitation of whey proteins on casein when heat treatment was done.

Table(2) deals with the yield of different cheeses during storage of four weeks at 6±2°C. The addition of preservatives solutions to the curd, slightly increased the yield of the fresh cheese by 3.14, 1.16 and 4.77% for P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively.

By the end of ripening, all treatments showed a marked decrease in yield being 39.46, 38.04, 36.13 and 39.67% loss in yield for P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively. The highest yield by the end of ripening (11.10%) was for Na-Benzoate cheese while the lowest (10.40%) was for control treatment (P<sub>1</sub>).

**Table (1).The chemical composition of whey strained from different treatment:(Results are average of three replicates)**

Treatment	Acidity%	pH	Fat%	TP%	TS%
P1	0.52	4.50	0.56	0.84	4.60
P2	0.37	5.46	0.55	0.84	4.55
P <sub>3</sub>	0.45	4.85	0.56	0.86	4.65
P <sub>4</sub>	0.41	5.15	0.57	0.85	4.60

P<sub>1</sub>control , P<sub>2</sub> 0.1% K-sorbate, P<sub>3</sub> 0.03%Na-Benzawate, P<sub>4</sub> admixture of K-sorbate and Na Benzoate(1:1) respectively.

Acidity and pH values were tabulated in Table (3).In all treatments, as ripening time progressed, acidity increased and pH decreased. Control treatment had the highest rate of acidity increase followed by Na-Benzoate treatment, while the lowest decreases was for K-Sorbate treatment after 3weeks.

Acidity values were 1.3, 1.1, 1.20and 1.20 for fresh cheese of P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub>.

The pH values behaved contrary to acidity development. Acidity values for ripened cheese reached 2.60, 1.80, 2.00 and 1.98% for P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively. In general preservatives had marked effect on decreasing the acidity of cheese. This is indirect effect which may be affected the number and activity of starter. This results were in agreement with those obtained by (Kholif et al 2001).

**Table (2).Yield of pyramids-like cheese during storage time at 6±2°C for four weeks , as affected by preservatives addition(Results are average of three replicates).**

Treatment	Storage time (weeks)	Yield %	Loss% in Yields
P1	0	17.18	-
	1	15.10	12.11
	2	12.40	27.82
	3	11.90	30.73
	4	10.40	39.46
P2	0	17.72	-
	1	15.61	11.91
	2	13.92	21.14
	3	12.95	26.92
	4	10.98	38.04
P3	0	17.38	-
	1	15.31	11.91
	2	13.81	20.54
	3	12.25	29.52
	4	11.10	36.13
P <sub>4</sub>	0	18.00	-
	1	15.89	11.72
	2	13.90	22.78
	3	11.92	33.78
	4	10.86	39.67

TS contents of different cheeses were shown in Table (4). As it is expected, as the ripening period advanced TS of all treatments increased. The addition of preservatives to the curd had no marked effect on total T.S of

fresh cheese ranged between 35.95 and 35.57% and after 4 weeks of storage ranged between 47.80 and 47.50% . By the end of ripening TS of P<sub>2</sub> was the highest among the other treatments, similar results were obtained by (Emara, 1990, Sakr, 1998; and Kholif et al, 2001).

**Table (3). Acidity pH and development of cheese as affected by preservative addition during ripening time of four weeks. (Results are average of three replicates)**

Treatment	Storage time (weeks)	Acidity%	Development of Rate of acid %	pH
P <sub>1</sub>	0	1.30	-	4.90
	1	1.60	23.08	4.80
	2	1.80	38.46	4.10
	3	2.00	53.85	3.80
	4	2.60	100.00	3.38
P <sub>2</sub>	0	1.10	-	5.20
	1	1.20	9.09	4.90
	2	1.35	22.73	4.50
	3	1.52	38.18	4.12
	4	1.80	63.64	3.74
P <sub>3</sub>	0	1.20	-	4.85
	1	1.45	20.83	4.26
	2	1.60	33.33	4.16
	3	1.72	43.33	4.00
	4	2.00	66.67	3.50
P <sub>4</sub>	0	1.20	-	4.85
	1	1.35	12.50	4.70
	2	1.38	15.00	4.30
	3	1.58	31.67	3.90
	4	1.98	65.00	3.60

From Table (4) it is clear that, as ripening period progressed, fat content of the cheese increased, this apparent increase is owing to the increase of dry matter of the cheese. The addition of preservative to the curd slightly decreased the fat content of the cheese. By the end of ripening the fat content of different cheeses were 20.00, 20.00, 20.00 and 20.10 for P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively. Similar to fat content, F/DM value, increased as ripening period progressed. Similar results were obtained by (Emara, 1990 and Ashmawy, 1997).

TN behaved contrary to fat content Table(4) the preservatives addition slightly increased the total nitrogen of the resultant cheese. For fresh cheese TN values ranged between 1.836 and 2.058% and ranged between 2.548 and 2.565%. By the end of ripening. TN/DM took irregular trend, For instance the TN/DM of P<sub>3</sub> were 5.650, 5.311, 5.615, 5.495 and 5.365% for fresh, 1, 2, 3 and for 4 weeks old cheese respectively. Similar tends of results were obtained By (Wolfschool and Furtedo,1979a) and(Emara ,1990).

Salt content of different cheeses ranged between 1.69 and 1.62% for fresh cheese and became 3.27 and 3.06 % for ripened cheese. Similar tends of results were obtained by (Hablas 2003) for pyramids-like cheese.

Table (5) deals with SN and NPN contents of the four treatments. SN and NPN highly increased as the ripening period advanced.

**Table (4).Gross chemical composition of goat's milk as affect by preservatives(during ripening time of four weeks, at 6±2°C (Results are average of three replicates).**

Treatment	Storage time (weeks)	TS %	Fat %	Fat/DM %	TN %	TN/DM %	Salt %	Salt/DM %
p <sub>1</sub>	0	35.30	15.00	42.49	1.836	5.201	1.64	4.65
	1	42.74	18.10	42.35	2.340	5.475	2.15	5.03
	2	44.71	18.90	42.27	2.440	5.457	2.45	5.48
	3	46.44	19.60	42.20	2.511	5.407	2.87	6.18
	4	47.50	20.00	42.10	2.556	5.380	3.17	6.67
p <sub>2</sub>	0	35.70	15.10	42.30	2.014	5.641	1.62	4.54
	1	41.61	17.60	42.30	2.222	5.340	2.05	4.93
	2	43.76	18.40	42.05	2.433	5.560	2.35	5.37
	3	46.28	19.40	41.92	2.546	5.501	2.86	6.18
	4	48.40	20.00	41.32	2.553	5.274	3.27	6.76
p <sub>3</sub>	0	35.69	15.10	42.31	2.016	5.650	1.65	4.62
	1	41.95	17.70	42.19	2.228	5.311	2.14	5.10
	2	43.19	18.20	42.14	2.425	5.615	2.51	5.81
	3	45.24	19.10	42.21	2.486	5.495	2.85	6.30
	4	47.50	20.00	42.10	2.548	5.364	3.06	6.44
p <sub>4</sub>	0	35.57	15.10	42.45	2.058	5.785	1.69	4.75
	1	41.25	17.50	42.42	2.355	5.709	2.05	4.97
	2	43.35	18.35	42.33	2.481	5.723	2.33	5.37
	3	45.90	19.40	42.26	2.531	5.514	2.97	6.47
	4	47.60	20.10	42.23	2.565	5.388	3.16	6.64

**Table (5).Development of SN&SN/TN and NPN &NPN/TN of different Cheeses during ripening as affected by preservatives addition.**

**(Results are average of three replicates).**

Treatment	Storage time (weeks)	SN %	SN/TN %	NPN %	NPN/TN%
P1	0	0.231	12.582	0.065	3.540
	1	0.432	18.461	0.101	4.320
	2	0.538	22.035	0.108	4.430
	3	0.765	30.470	0.133	5.296
	4	0.830	32.470	0.154	6.025
p <sub>2</sub>	0	0.201	9.980	0.039	1.940
	1	0.297	13.370	0.069	3.105
	2	0.369	15.166	0.097	3.986
	3	0.416	16.340	0.117	4.600
	4	0.442	17.310	0.125	4.869
p <sub>3</sub>	0	0.213	10.570	0.045	2.232
	1	0.301	13.510	0.084	3.770
	2	0.395	16.300	0.095	3.920
	3	0.417	16.773	0.119	4.800
	4	0.507	19.897	0.138	5.416
p <sub>4</sub>	0	0.224	10.884	0.043	2.089
	1	0.332	14.100	0.075	3.148
	2	0.402	16.203	0.102	4.213
	3	0.435	17.190	0.121	4.780
	4	0.462	18.010	0.129	5.029

The addition of preservatives to the curd, highly decreased values of SN and NPN. This is may be due to the effect of preservative on decreasing and/or inhibiting the activity of starter bacteria. By the end of ripening the SN values were 0.830 and 0.442, 0.507 and 0.462% for P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively. Similar to TN, SN and NPN increased by time of ripening and also values were less for preservatives treatments as compared with control. (SN/TN and NPN/TN) were (12.582-3.540), (9.980-1.940), (10.570-2.232) and (10.884 and 2.089%) for fresh cheese of P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively. respective values for ripened cheese were (32.470-6.025), (17.310-4.896), (19.879-5.416) and (18.011 and 5.029%) respectively (Wolfschoon and Furted, 1979b; Kandeel et al, 1991; and Sakr, 1998).

Table (6) illustrates the numbers of colonies appeared on T.C, L.A, Coliform and M&Y media as affected by the type of preservative added to the curd of the cheese. The addition of different preservatives to the cheese curd highly decreased the T.C and L.A bacteria of the cheese during the four weeks of ripening.

K-Sorbate had the strongest effect followed by the admixture preservative (1:1) and the lowest was for Na-Benzoate. M&Y were absent for the four treatments after one week, while they appeared in control cheese during the second week and increased gradually in number during the last week, after 2 weeks M&Y were appeared Na-Benzoate treatment. Admixture preservative(1:1) cheese showed M&Y colonies during the last week of ripening. While no colonies of M&Y were appeared in K-Sorbate treatment after 4 weeks. Similar results were obtained by (Hablas,2003)who found that the number was higher in control cheese as compared with preservative cheeses.

From Table (6) the most effective preservatives against yeast and mould is K-Sorbate since no colonies were appeared after 30 days of storage. The presence of few colonies of Coliform colonies medium is may be due to contamination from the storage room, luckily by the end of ripening no colonies were disappeared, it seems that the cheese starter had certain effect on inhibiting microbes grown on Coliform medium. The number of TC and LA at the beginning were ( $140 \times 10^5$ - $1.0 \times 10^5$ ), ( $68 \times 10^5$ - $0.5 \times 10^5$ ), ( $80 \times 10^5$  - $0.7 \times 10^5$ ) and ( $72 \times 10^5$ - $0.7 \times 10^5$ ) and for p<sub>1</sub>,p<sub>2</sub>,p<sub>3</sub> and p<sub>4</sub> respectively. As ripening period progressed number of colonies highly decreased to reach ( $28 \times 10^5$  - $.06 \times 10^5$ ), ( $3 \times 10^5$  - $0.03 \times 10^5$ ), ( $14 \times 10^5$ - $0.05 \times 10^5$ ) and ( $5 \times 10^5$  - $0.03 \times 10^5$ ) respectively.

From the heart of the cheeses, cubes were cut for body&texture and flavor evaluation. The results of sensory evaluation were shown in Table(7). Panelists gave the lowest scoring points for appearance and color for cheese had moulds and yeasts (control). The inner cubes of cheese was the best for control followed by Na-Benzoate treatment since the preservatives did not affect the ripening indices. At the beginning of evaluation panelists refused the control cheese after one week because of the yeast and mould growth, but when samples was taken from the inside layers, they gave good scoring point for body&texture and flavor. K-Sorbate treatment gained less scoring point although no moulds were found but flavor was less pronounced, this is

may be due to the effect of K -Sorbate on lactic acid bacteria(LAB). In general panelists accepted this new type of cheese without fungi growth.

**Table (6).Enumeration of colonies grown on TC,LA Coliform and M&Y media as effected by type preservative addition (Results are average of three replicates).**

Treatment	Storage time	T.C	L.A	Coliform	M,Y
p <sub>1</sub>	0	140*10 <sup>5</sup>	1.0*10 <sup>5</sup>	0.02*10 <sup>2</sup>	-
	1	110*10 <sup>5</sup>	0.8*10 <sup>5</sup>	0.01*10 <sup>2</sup>	-
	2	44*10 <sup>5</sup>	0.28*10 <sup>5</sup>	-	0.5*10 <sup>5</sup>
	3	38*10 <sup>5</sup>	0.11*10 <sup>5</sup>	-	0.7*10 <sup>5</sup>
	4	28*10 <sup>5</sup>	0.06*10 <sup>5</sup>	-	0.8*10 <sup>5</sup>
p <sub>2</sub>	0	68*10 <sup>5</sup>	0.5*10 <sup>5</sup>	-	-
	1	39*10 <sup>5</sup>	0.4*10 <sup>5</sup>	-	-
	2	17*10 <sup>5</sup>	0.25*10 <sup>5</sup>	-	-
	3	11*10 <sup>5</sup>	0.11*10 <sup>5</sup>	-	-
	4	3*10 <sup>5</sup>	0.03*10 <sup>5</sup>	-	-
p <sub>3</sub>	0	80*10 <sup>5</sup>	0.7*10 <sup>5</sup>	0.01*10 <sup>2</sup>	-
	1	66*10 <sup>5</sup>	0.39*10 <sup>5</sup>	0.01*10 <sup>2</sup>	-
	2	54*10 <sup>5</sup>	0.28*10 <sup>5</sup>	-	-
	3	28*10 <sup>5</sup>	0.12*10 <sup>5</sup>	-	0.3*10 <sup>5</sup>
	4	14*10 <sup>5</sup>	0.05*10 <sup>5</sup>	-	0.3*10 <sup>5</sup>
p <sub>4</sub>	0	72*10 <sup>5</sup>	0.7*10 <sup>5</sup>	-	-
	1	49*10 <sup>5</sup>	0.30*10 <sup>5</sup>	0.01*10 <sup>2</sup>	-
	2	40*10 <sup>5</sup>	0.19*10 <sup>5</sup>	0.01*10 <sup>2</sup>	-
	3	15*10 <sup>5</sup>	0.11*10 <sup>5</sup>	-	-
	4	5*10 <sup>5</sup>	0.03*10 <sup>5</sup>	-	0.2*10 <sup>5</sup>

**Table (7). Organoleptic properties of different pyramids cheese during four during ripening as affected by preservatives addition. (Results are average of three replicates).**

Treatment	Storage time	Color and appearance 10	Body and texture		Total
			30	60	
p <sub>1</sub>	0	9.0	16.5	29.4	54.9
	1	8.0	19.0	34.0	61.0
	2	5.0	23.5	38.0	66.5
	3	4.0	26.5	45.6	76.1
	4	3.0	28.0	51.6	82.6
p <sub>2</sub>	0	9.0	16.0	28.0	53.0
	1	9.0	18.0	30.0	57.0
	2	9.0	23.5	35.0	67.5
	3	7.0	26.0	42.0	75.0
	4	6.0	26.0	44.0	76.0
p <sub>3</sub>	0	9.0	16.0	29.0	54.0
	1	9.0	19.0	33.0	61.0
	2	6.0	25.0	37.0	68.0
	3	6.0	26.0	44.5	76.5
	4	4.5	26.5	48.5	79.5
p <sub>4</sub>	0	9.0	16.0	28.0	53.0
	1	9.0	18.0	35.0	62.0
	2	8.0	24.0	36.0	68.0
	3	7.0	25.0	45.0	77.0
	4	5.0	26.0	48.0	79.0

As ripening period advanced the total scoring points increased, as well control cheese had the highest scoring for texture and flavor but the lowest for the color and appearance because of the presence of moulds. By the end of ripening total scoring points were 82.6, 76.0, 79.5 and 79.0 for control, P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively.

(Emara, 1990) found that Chever cheese of the best organoleptic properties could be consumed after four weeks.

(Hablas, 2003) found that control cheese had good texture and highly accepted flavor when samples were taken from inside the pyramids –like cheese

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محمد ابراهيم زين الدين\* - السيد شوقي السكرى\*\* - يحيى ابراهيم عبد القادر\*\*\* و منى محمد الصديق\*\*\*\*

\* كلية السياحة و الفنادق - جامعة المنصورة.

\*\* قسم الالبان - كلية الزراعة - جامعة المنصورة.

\*\*\* معهد بحوث الانتاج الحيوانى - الدقى - القاهرة

\*\*\*\* قسم الارشاد الزراعى - وزارة الزراعة.

١-تأثير استخدام أنواع مختلفة من المواد الحافظة على جودة الجبن الهرمي الناتج تصنع جبن الماعز الفرنسية من لبن الماعز الخام وينمو على سطحها الفطر والخمائر بكثافة وأحيانا تضاف جراثيم الفطر للحصول على نموات كثيفة من الفطريات الزرقاء بينما الذوق المصري يرفض وجود النموات الفطرية على أسطح الجبن ويعتبر هذا من أنواع الفساد الغذائي ولذا يهدف هذا البحث لإنتاج جبن ماعز مشابه لجبن الماعز الفرنسية(الجبن الهرمي) بدون نموات فطرية وذلك باستخدام ثلاث أنواع مختلفة من المواد الحافظة وهى ٠,١% من سوربات البوتاسيوم و ٠,٣% بنزوات الصوديوم وخليط منهما بنسبة ١:١ لدراسة تأثير أيهما اقوي تثبيطا لنمو الفطريات والخمائر على أسطح الجبن كما أجريت معاملة كمنترول بدون إضافة مادة حافظة للمقارنة حيث استخدم لبن ماعز محتوى على ١٣,٥% مواد صلبة و ٤,١% بروتين و ٤,٣% دهن و حموضة ٠,١٨% ثم معاملة اللبن حراريا لدرجة ٦٣م° لمدة ٣٠ دقيقة ثم التبريد لدرجة ٣٢م° ثم إضافة ٠,٥% بادئ الزبادي ثم المنفحة المخففة جدا ٠,٠٥%

للحصول على خثره طرية من (١٤ : ١٦ ساعة) ثم التصفية في مصفاة مبطنة بالشاش من (٦:٤ ساعات) ثم إضافة المواد الحافظة في صورة محاليل ثم تغليبها جيدا ثم التعبئة في القوالب الهرمية ثم تملح الجبن الناتج بنسبة ١% ثم التخزين في الثلجة على درجة ٦±٢م° لمدة ٤ اسابيع مع الملاحظة اليومية لنمو الفطريات والخمائر ولقد بينت النتائج إن إضافة المواد الحافظة قللت من تطور الحموضة سواء في الشرش المجمع أو في الجبن الناتج وكانت اقل تسبه حموضة في جبن سوربات البوتاسيوم يليها المخلوط من المواد الحافظة يليها بنزوات الصوديوم إما اعلى حموضة فكانت للكنترول ولم تؤثر المادة الحافظة كثيرا على الريع فيما عدا بنزوات الصوديوم التي رفعت الريع قليلا كما إن إضافة المادة الحافظة قللت بشكل واضح من النيتروجين الزائب والنيتروجين الغير بروتيني كما أدت إضافة المادة الحافظة إلى تقليل أعداد الميكروبات الكلية وبكتريا حامض اللاكتيك حيث تأثرت هذه المجموعات بدرجة اكبر مع استخدام سوربات البوتاسيوم ولم تظهر اى نموات فطرية أو خمائر عند استخدام السوربات خلال الأربع أسابيع بينما ظهرت بعد ٨ ايام في الجبن الكمنترول وفي حالة استخدام بنزوات الصوديوم في بداية الأسبوع لثالث أما فى حالة استخدام الخليط ظهرت النموات في بداية الأسبوع الرابع. لذا يوصى باستخدام سوربات البوتاسيوم للحصول على جبن خالي من النموات لفطريه إلا إن إضافة السوربات أثرت قليلا على إعداد بكتريا حامض الاكتيك التي تعمل على تسوية الجبن لذا هناك حاجة لتجارب أخرى لاختيار طرق إضافة سوربات البوتاسيوم في خطوات الصناعة المختلفة للحصول على جبن جيد ودون تأثير على تسوية الجبن.