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EFFECT OF SOME CHEMICAL ADDITIVES ON BEEF PROPERTIES DURING STORAGE UNDER LOW TEMPERATURE

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ABSTRACT

Minced beef had been prepated with appropiate ingredients with addition of three levels of Na No_2/100 gm. Zero level (control) besides 100 ppm Na No_2 and (50 ppm Na No_2 and 0.20 % ascorbic acid) were used in this study .

The end products weere packed in polyethelene bags and stored at-2o C for 3months other treatments stored at 4°C for 9 days. Samples were withdrawn monthly and dialy to determine the following parameters: Moisture, protein, Lipids, Ash, carbohydrates total volatile nitrogen (T.V.N), Trymethy lamine (T.M.A), Thiobarbituric acid (T.B.A.), pH value, colour intensity, total bacterial count, (TBC), total bacterial spores count (TBSC), Pseudomonas sp.(Pse); Staphylococcus aureus and Coliform group.

The data revealed that moisture, protein, carbohydrates, colour, intensity, (TBC), (TBSC), (Pse) and (Staph.) were affected by frozen storage and increasing of nitrite levels. On the other hand, there were slight increasing of lipid, ash, TVN, TMA TBA and pH value with increasing of frozen periods and using nitrite comparing with untreatments samples. Results showed that improving colour intensity of samples by using 50 ppm Na No_2 + 0.2 % ascovbic acid.

However, the treatment of 100 ppm Na No_2 was an ideal concentration and samples were stable for long time at frozen conditions. No evidence of bacterial spoilage or other deteriorative change could be detected at any time.

INTRODUCTION

Protein play an important role in the life of man and nations. Meat is an important source of protein in human nutrition, particularly in certain developing countries. In Egypt most of people suffer from lack of meat, hence the local consumption decreased to around 12 gm. daily.

Hoffman (1977) showed that the increasing in bacterial counts during storage of sausage for 10-14 days at 4-5 °c, products at the end of this period became unacceptable.

Wiegner (1985) found that during beef storage at 2°c total count rose to a maximum of 10^8/g after 8 weeks in sterile-packaged samples. Irrespective of meat pH, lactobacilli

increased to dominate the storage flora, D-lactate concentration increased in paralled with growth of lactic acid bacteria, and might be used as a criterion of freshness, except in meat with low initial carbohydrate concentration.

Daoud (1967) determined the chemical composition of fresh buffalo meat in Egypt and recorded that moisture, protein, fat and ash were 75.10,91.84,3.61 and 4.53%, respectively, on dry weight basis.

Subsequently, Abdallah et al., (1978) determined the chemical composition of fresh camel meat and recorded that moisture, protein, fat and Ash were 77.08, 93.89,1.18 and 4.84% respectively, on dry weight basis. Recently Ibrahim et al., (1985) determined the chemical composition of imported frozen meat in Egypt and recorded that moisture, protein and fat were 79.08, 18.60 and 2.10, respectively, on wet weight basis.

Amir et al., (1985) determined the proximate composition of local Egyptian fresh buffalo and imported frozen meat and showed that moisture, total lipids, protein and ash contents were: 72.00 %, 77,25 %, 3.42 %, 2.53 %, 19.62 %, 15.72 % and 0.59 %, 0.50 % respectively.

The total volatile nitrogen content increased during cold storage in refrigerator (Sengupta and Roy 1975, El-Dashlouty, 1978)

Ibrahim and El-Zonfuly (1980) reported that trimethylamine can be synthesized from amino compounds such as betain, choline, acetyl choline and trimethylamine oxide.

Sebranek et al., (1979) studied the effect of three different freezing methods i.e., liquid nitrogen, liquid carbon dioxide and blast freezing on TBA values of three different types of beef patties; all beef with 20 % fat, all beef with 30 % fat and beef with 20 % fat + 5% .Textured Soy protein (TSP) during storage at -29 °C for 180 days. They found that TBA numbers increased slowly with frozen storage time in all beef 20 % fat patties and patties containing TSP, while 30 % fat patties showed the largest TBA numbers between 30 and 180 days sampling periods. In addition T.B.A. numbers of 30 % fat patties, frozen by blast freezing, increased at a faster rate than of those by cryogenic methods.

This, study was carried out to determined the lowest effective concentration of Na NO_2 with best keeping quality of minced beef, Effect of Freezing method, frozen and cold storage on the microbiological and chemical properties of minced beef were also investigated.

MATERIALS AND METHODS

I- Materials: beef were purchased from local slaughter house and minced by meat grinder. During preparation of minced beef Na No_2 was added with O, 100 ppm and (50 ppm Na No_2+0.2% ascorbic acid). The prepared minced beef, were stored after packaging in poly etheline bags at 4°C for 9 days and -20°C for 8 months. Samples were withdrawn daily and monthly for migrobiolcgical and chemical evalution.

II- Methods: Total bacterial count (TBC) was determined according to sharf, (1966) Total bacterial spores count (TBSC) was determined according to Frazer and Foster, (1950). Pseudomonas sp and Staphylococus aureus were determined by using selective media according to Oxoid (1982). Coliform group was determined according to method described by Difco, (1977).

Moisture, protein, lipid ash contents and pH value were determined according To AOAC, (1984).

Total volatile nitrogen (TVN) and trimethyle amine (TMA) were determined as described by Winton and Winton (1958). Thiobarbituric acid (TBA) was adopted according to pearson, (1970). Colour intensity was determined according to Hussainy et al., 1950).

RESULTS AND DISCUSSION

1- effect of frozen storage at -20°C) fot 8 months on some chemical constituents of minced beef:

Form Table (1) the moisture content of samples (I,II and III) were slightly decresed during frozen storage .

These results could be due to the evaporation of moisture from the outer surface of samples..

These results are inagreement with Abdallah et al. (1978) and Yassa (1985) .

The crude protein content slightly decreased this decrease of meat by microrganisms, which lead to formation of volatile nitrogenous substances and soluble substances that scaped from the tissues as well as the separation of drip during freezing storage.These results are in accordance with Halliday, 1972, Abdallah et al., (1978) and Yassa (1985).

Lipid and ash contents of tested samples were increased during frozen storage

These results accordance with Gangel and Manger (1963).

From the results it could be noticed that carbohydrates content was decreased during frozen. storage which had due to decomposition of meat by microorganisms that could be ascribed to the breakdown of glycogen.

These results were accordance with Gangel and Manger (1963) and Mohamed (1987).Results of Table (2) snowed that the total volatile nitrogen (T.V.N.), (T.M.A.) and (TBA) Values were increased during frozen storage.

The increase in T.V.N. may be attributed to the activity of microorganisms which survived frozen storage and relatively to more pronounced increase of total bacterial counts. The increase of T.V.N. during frozen storage resulted from decomposition and degradation on mitrogen substance as noticed by Sokolov, (1965). These results are in accordance with Salem, (1987) and El-shamery (1988).

The data of Table (3) indicated that pH volue of samples was slightly decreae at the starting, during storage and increased at the end of storage period .

This slight decrease of pH due to decomposition of meat by microorganisms that could be ascribed to the breakdoown of glycogen with formation of lactic acid, i.e anaerabic glycolysis. and noticed at the end that pH increased, this the increased due to decomposition of meat by microorganisms which load to formation of volatile nitrogenous or that might be explained by the formation of free alkaline groups due to destruction of protein by proteolysis.

These results were in agreement with Hassan (1976), Yassa (1985) and Bahlol, (1989).

The colour intensity of samples was decreased during frozen storage for 8 months .

2- Effect of freezing storage on the bacterial load of sample:

The total bacterial count (T.B.C.) the bacterial spores (T.B.S.) the pseudomonas and staphylococcus aureus of samples were decreased during storage period as showed in Table (4). The results agreed with Mohamed (1974) and El-zayet (1980).

Effect of cold storage at 4°C for 9 days on chemical constituents of minced beef

From results of Table (5) it could bee noticed that the moisture content of minced beef had decreased during cold storage. These results could be due to the evaporation of moisture from the outer surface of minced beef samples. Similar results were reported by Abdallah et al., (1978). and Mogazy (1990).

From the data presented in same Table it cold be notice that the protein content in samples were highly decreased during cold storage. This decrease in protein content could be due to loss of nitrogen as volatile bases as well as

protein denaturation. Moreover, The destruction of protein resulted in the formation of volatile nitrogenous substances which resulted protein losses. The breakdown of protein in the samples may be considered to be caused by the natural enzymes present in meat tissue and by the active metabolism of proteolytic microorganisms present in the product. These results are in agreement with those reported by Halliday (1972), Yassa (1985) and Mogazy (1990).

Table (5) showed that changes of lipid content of samples during cold storage were in creased with increasing of storage period. This increasing of lipids percentage on dry weight basis could be due to the high decreace of moisture, as well as, the evaporation from the outer surface of samples during storage. Ash content of samples were increased during cold storage. These results are in accordance with Yassa (1985) and Salem, (1987).

The data presented in Table (6) indicated that the total volatile nitrogen (T.V.N.) of samples were increased during cold storage. These increasing could be due to the breakdown of nitrogen compounds, as well as protein autolysis, hence autolysis bacterial decomposition . . (T.V.N.) was determined as an index of the degree of putrefaction, decomposition and the degree of proteogeneous breakdown. These results are in accordance with Salem, (1987) and Mogazy (1990).

The data presented in Table (6) showed that the trimethyl amine (T.M.A.) of samples were increased during cold storage. This increasing of T.M.A. results from breakdown of amino acids.

The thiobarbituric acid number (T.B.A.) is one determination which is applied for the evaluation of the lipid quality. The changes of T.B.A Value of samples were increased during cold storage. Simler results was reported by Salem et al (1987) and El-Shamery, (1988).

The data present in Table (7) showed that there were changes of pH value of tested samples. On the other hand, the colour intensity was decreased slightly during cold storage. This is due to oxidation especially by the action of microorganisms . These results are in agreement with those reported by Demyer and Vandekerckhave., (1979). and Salem, (1987).

Table (8) showed that the total bacterial counts, total bacterial spores counts, Pseudomonas sp. and staphylococcus aureus were highly increased during cold storage. These results were in accordance with those found by Noskova and Peak (1959), Sokolv, (1965) and Ockerman et al., (1975)

Coliform-group was not detected in all tested samples.

From this study, it can suggested that, if the treated samples packed in polyethelene bags and frozen at (-20°C), can be stored in good condition long period 8 months.

Table (1): Changes of chemical composition of minced beef samples (I,II and III) during frozen storage at -20 C for 8 months.

Storage period (days)	Treatments	Moisture %		Protein %		Lipids %		Ash %		Carbohydrates%	
		WW	DW	WW	DW	WW	DW	WW	DW	WW	DW
0	I	68.76	0	18.88	60.44	10.40	33.30	0.91	2.22	1.05	3.34
1		68.66	0	18.88	60.23	10.48	33.46	0.93	2.97	1.05	3.34
2		68.56	0	18.87	60.00	10.58	33.65	0.95	3.03	1.04	3.32
3		68.52	0	18.88	59.96	10.62	33.74	0.96	3.05	1.02	3.25
4		68.48	0	18.88	59.91	10.66	33.82	0.97	3.08	1.01	3.19
5		68.43	0	18.90	59.89	10.69	33.85	0.98	3.09	1.0	3.17
6		68.38	0	18.93	59.88	10.71	33.87	0.98	3.10	1.0	3.15
7		68.34	0	18.95	59.86	10.73	33.90	0.99	3.12	0.99	3.12
8		68.31	0	18.95	59.80	10.76	33.96	0.99	3.13	0.99	3.11
0	II	70.20	0	18.01	60.44	9.92	33.30	0.87	2.22	1.0	3.34
1		70.08	0	18.07	60.40	9.97	33.33	0.88	2.94	1.0	3.33
2		70.00	0	18.07	60.22	10.04	33.48	0.89	2.98	1.0	3.32
3		69.94	0	18.07	60.10	10.10	33.59	0.90	3.01	0.99	3.30
4		69.90	0	18.07	60.02	10.14	33.68	0.91	3.03	0.98	3.27
5		69.87	0	18.07	59.97	10.17	33.77	0.92	3.05	0.97	3.21
6		69.82	0	18.09	59.94	10.21	33.83	0.92	3.05	0.96	3.18
7		69.80	0	18.09	59.90	10.23	33.87	0.93	3.07	0.95	3.16
8		69.77	0	18.10	59.87	10.25	33.89	0.93	3.09	0.95	3.16
0	III	70.20	0	18.01	60.44	9.92	33.30	0.87	2.92	1.0	3.34
1		70.00	0	18.11	60.38	10.01	33.36	0.89	2.95	0.99	3.31
2		69.96	0	18.09	60.21	10.06	33.50	0.90	2.99	0.99	3.30
3		69.93	0	18.06	60.07	10.11	33.63	0.91	3.02	0.99	3.28
4		69.90	0	18.06	60.00	10.14	33.70	0.92	3.04	0.98	3.26
5		69.87	0	18.07	59.96	10.18	33.79	0.92	3.05	0.96	3.20
6		69.82	0	18.07	59.90	10.22	33.86	0.93	3.07	0.96	3.17
7		69.80	0	18.07	59.86	10.24	33.90	0.94	3.10	0.95	3.14
8		69.78	0	18.08	59.82	10.26	33.95	0.94	3.10	0.94	3.13

WW = wet weight basis, DW = Dry weight basis.

I : Minced meat (control).

II : Minced meat treated with 100 ppm sodium nitrite.

III : Minced meat treated with 0.2% ascorbic acid and 50 ppm nitrite sodium

* : Other carbohydrates obtained by difference.

Table (2): Comparative effects of frozen storage at (-20 C) for 8 months of minced beef Samples (I,II, and III) on chemical freshness Parameters (calculated on wet weight basis).

Storage period of (months)	Treatments																	
	I						II						III					
	T.V.N.		T.M.A.		T.B.A.		T.V.N.		T.M.A.		T.B.A.		T.V.N.		T.M.A.		T.B.A.	
	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
0	5.80	100	0.90	100	0.15	100	4.71	100	0.75	100	0.15	100	0.15	100	0.80	100	0.15	100
1	8.50	146.55	1.03	114.44	0.17	113.33	6.15	130.57	0.92	122.67	0.16	106.67	7.30	143.14	0.43	116.25	0.16	106.67
2	10.10	174.14	1.13	125.56	0.21	140.00	7.90	157.73	0.99	132.0	0.18	120.00	9.15	179.41	1.10	137.5	0.19	126.67
3	12.41	213.97	1.26	140.00	0.25	166.67	9.10	193.21	1.15	153.33	0.20	133.33	11.70	222.41	1.19	148.75	0.22	146.67
4	14.05	242.24	1.38	153.33	0.29	193.33	11.30	239.92	1.29	172.0	0.21	140.00	13.60	266.67	1.30	162.5	0.24	160.00
5	15.93	274.66	1.59	176.67	0.31	206.67	13.80	292.99	1.34	178.67	0.23	153.33	15.00	294.12	1.38	172.5	0.27	180.00
6	17.14	295.52	1.78	197.78	0.36	240.00	15.01	318.68	1.51	201.33	0.24	160.00	16.11	315.88	1.59	198.75	0.28	186.67
7	20.00	344.83	1.91	212.22	0.40	266.67	17.20	365.18	1.66	221.33	0.26	173.33	18.10	354.90	1.78	222.5	0.31	206.67
8	22.15	381.90	2.40	266.67	0.42	313.33	17.70	375.80	1.72	229.33	0.27	180.00	19.19	376.27	1.94	242.5	0.33	220.00

I : Minced meat (control)

II: Minced meat treated with 100 ppm soium nitrite.

III: Minced meat treated with 0.2 % ascorbic acid and 50 ppm sodium nitrite.

T.V.N: Total Volatile nitrogen

T.M.A: Trimethyl amine

T.B.A: Thiobarbituric acid

Table (3): The changes in PH values and Colour intemsity as an index of quality of minced beef samples (I,II and III) during fro3en storage at -20° C for 8 months.

Storage period (months)	Treatments I PH value	I Colour intensity	II PH value	II Colour intensity	III PH value	III Colour intensity
0	6.00	0.710	6.00	0.710	5.95	0.710
1	5.95	0.691	5.90	0.695	5.92	0.700
2	5.90	0.680	5.90	0.691	5.90	0.696
3	5.87	0.661	5.88	0.686	5.87	0.691
4	5.85	0.649	5.86	0.680	5.85	0.687
5	5.82	0.620	5.84	0.670	5.82	0.684
6	5.80	0.610	5.83	0.655	5.80	0.678
7	5.83	0.607	5.80	0.648	5.81	0.665
8	5.85	0.600	5.81	0.639	5.83	0.651

* Measured as optical density at 542 Mu
I : Minced beef (control)
II : Minced beef treated with 100 ppm Sodium nitrite
III: Minced beef treated with 0.20 % ascorbic acid and 50 ppm sodium nitrite.

Table (4): Comparative effect of frozen storage at (-20 °C) for 8 months of minced beef samples (I,II,and III) on total bacteriial count (TBC), total bacterial spores count (TBSC), Pseudomonas sp, Staphylococcus aureus and colifo-rm-group.

Storage period (months)		TBC		TBSC		Pseadomons sp.		Staohylococcus aureus		Coliform group	
		Survivors X 10⁴	Log survivors	Survivors X 10	Log survivors	Survivors X 10	Log survivors	Survivors X 10	Log survivors	Survivors X 10	Log survivors
0		4.10	4.61	16.87	2.22	4.81	1.56	8.30	1.22	N.L..	-
1		3.05	4.48	12.10	2.08	4.12	1.61	7.53	1.53	N.L.	-
2		2.92	4.47	7.30	1.86	3.66	1.56	6.65	1.82	N.L..	-
3		2.71	4.43	6.00	1.78	3.40	1.53	6.12	1.79	N.L..	-
4	I	2.55	4.41	4.60	1.66	3.32	1.52	5.50	1.74	N.L..	-
5		2.20	4.34	3.30	1.52	3.24	1.51	4.65	1.67	N.L..	-
6		2.10	4.32	2.40	1.40	3.14	1.50	3.81	1.58	N.L..	-
7		2.00	4.70	1.60	1.38	3.04	1.48	2.73	1.44	N.L..	-
8		1.80	4.26	0.80	0.90	2.89	1.46	2.10	1.32	N.L.	-
0		0.52	3.72	1.60	1.20	0.93	0.97	5.20	1.72	N.L..	-
1		0.46	3.66	1.46	1.16	0.87	0.94	4.56	1.66	N.L..	-
2		0.41	3.61	1.35	1.13	0.82	0.91	3.97	1.60	N.L..	-
3		0.33	3.52	1.23	1.09	0.76	0.85	3.64	1.56	N.L..	-
4	II	0.25	3.40	1.10	1.04	0.71	0.85	1.91	1.46	N.L..	-
5		0.18	3.26	0.99	0.99	0.66	0.82	2.02	1.31	N.L..	-
6		0.14	3.15	0.89	0.95	0.62	0.79	1.39	1.14	N.L..	-
7		0.09	2.95	0.71	0.85	0.60	0.78	0.37	0.86	N.L..	-
8		0.03	2.48	0.58	0.76	0.57	0.76	0.15	0.18	N.L..	-
0		1.10	4.04	4.30	1.63	1.10	1.04	7.20	1.86	N.L..	-
1		0.86	3.93	4.02	1.60	1.02	1.01	6.44	1.81	N.L..	-
2		0.60	3.78	3.75	1.57	0.99	0.99	5.66	1.75	N.L..	-
3	III	0.50	3.70	3.10	1.49	0.87	0.94	5.13	1.71	N.L..	-
4		0.42	3.62	2.42	1.38	0.83	0.92	5.13	1.71	N.L..	-
5		0.35	3.54	2.23	1.35	0.79	0.90	3.77	1.58	N.L..	-
6		0.29	3.45	2.10	1.32	0.71	0.88	3.04	1.48	N.L..	-
7		0.21	3.32	1.85	1.27	0.71	0.85	2.32	1.37	N.L..	-
8		0.12	3.09	1.60	1.20	0.68	0.85	1.61	1.21	N.L..	-

I : Minced beef (control).
II : Minced beef treated with 100 ppm sodium nitrite.
III : Minced beef treated with 0.2% asorbic acid and 50 ppm Sodium nitrite.

Table (5): Changes of chemical composition of minced beef samples (I,II and III) during cold storage at 4°C for 9 days.

Storage period (days)	Treatments	Moisture %		Protein %		Lipids %		Ash %		Carbohydrates%	
		WW	DW	WW	DW	WW	DW	WW	DW	WW	DW
0	I	68.76	0	18.88	60.44	10.40	33.30	0.91	2.92	1.05	3.34
1		68.16	0	19.23	60.40	10.61	53.35	0.93.	2.93	1.05	3.32
2		67.33	0	19.73	60.78	10.91	33.41	0.96	2.93	1.07	3.28
3		66.73	0	20.05	60.28	11.17	33.56	0.98	2.95	1.07	3.21
4		66.15	0	20.34	60.11	11.45	33.82	1.01	2.98	1.05	3.09
5		65.65	0	20.62	60.04	11.67	33.96	1.03	2.99	1.03	3.01
6		65.14	0	20.85	59.82	11.90	34.15	1.07	3.06	1.04	2.97
7		64.90	0	20.96	59.73	12.01	34.21	1.09	3.11	1.04	2.95
8		65.52	0	21.17	59.66	12.16	34.28	1.12	3.16	1.03	2.90
9		64.00	0	21.41	59.48	12.42	34.49	1.15	3.19	1.02	1.84
0	II	70.20	0	18.01	60.44	9.92	33.30	0.87	2.92	1.0	3.34
1		69.75	0	18.27	60.41	10.09	33.34	0.88	2.92	1.01	3.33
2		69.60	0	18.36	60.38	10.14	33.28	0.89	2.93	1.01	3.31
3		69.00	0	18.71	60.35	10.37	33.44	0.91	2.94	1.01	3.27
4		68.86	0	18.78	60.30	10.43	33.50	0.92	2.96	1.01	3.24
5		68.51	0	18.97	60.24	10.56	33.55	0.95	3.00	1.01	3.21
6		68.39	0	19.04	60.16	10.63	33.59	0.97	3.07	1.01	3.18
7		68.00	0	19.20	60.00	10.81	33.79	1.0	3.11	0.99	3.10
8		67.20	0	19.66	59.93	11.12	33.91	1.03	3.13	0.99	3.03
9		66.92	0	19.79	59.81	11.26	34.04	1.04	3.15	0.99	3.00
0	III	70.20	0	18.01	60.44	9.92	33.30	0.87	2.92	1.0	3.34
1		69.81	0	18.24	60.42	10.06	33.32	0.88	2.92	1.01	3.34
2		69.70	0	18.30	60.39	10.10	33.35	0.90	2.96	1.0	3.30
3		69.40	0	18.46	60.32	10.22	33.41	0.92	2.99	1.0	3.28
4		69.12	0	18.61	60.28	10.34	33.47	0.93	3.02	1.0	3.23
5		68.84	0	18.75	60.17	10.46	33.58	0.95	3.05	1.0	3.20
6		68.23	0	19.09	60.10	10.71	33.70	0.98	3.08	0.99	3.12
7		68.02	0	19.14	59.87	10.87	33.99	1.0	3.12	0.97	3.02
8		67.50	0	19.43	59.78	11.09	34.13	1.02	3.13	0.96	2.96
9		67.10	0	19.63	59.66	11.27	34.25	1.04	3.17.	0.96	2.92

WW = wet weight basis, DW = Dry weight basis.

I : Minced beef (control)

II : Minced beef treated with 100 ppm sodium nitrite.

III : Minced beef treated with 0.20% ascorbic acid and 50 ppm sodium nitrite.

• : Other carbohydrates obtained by difference.

Table (6): Comparative effects of cold storage at 4 C for 9 days of minced meat samples (I,II, and III) on chemical freshness parameters (calculated on wet weight basis).

Storage period of (days)	I T.V.N. Value	I T.V.N. %	I T.M.A. Value	I T.M.A. %	I T.B.A. Value	I T.B.A. %	II T.V.N. Value	II T.V.N. %	II T.M.A. Value	II T.M.A. %	II T.B.A Value	II T.B.A %	III T.V.N. Value	III T.V.N. %	III T.M.A. Value	III T.M.A. %	III T.B.A. Value	III T.B.A. %
0	5.80	100	0.90	100	0.15	100	4.71	100	0.75	100	0.15	100	5.10	100	0.80	100	0.15	100
1	9.10	156.89	1.05	116.67	0.17	113.33	7.10	150.74	0.95	126.67	0.16	106.67	8.20	160.78	0.97	121.25	0.16	106.67
2	13.23	228.10	1.16	128.89	0.20	133.33	9.72	206.36	1.05	140.0	0.17	113.33	10.01	196.27	1.11	138.75	0.18	120.0
3	16.51	284.65	1.32	146.67	0.23	153.33	10.64	225.90	1.14	152.0	0.19	126.67	11.50	225.49	1.23	153.75	0.20	133.33
4	18.14	312.75	1.57	174.44	0.27	180.0	12.11	257.11	1.23	164.0	0.20	133.33	13.30	260.78	1.73	171.25	0.23	153.33
5	20.00	344.82	1.73	192.22	0.34	266.67	13.22	280.67	1.34	178.67	0.22	146.67	14.70	288.23	1.49	186.25	0.25	166.67
6	22.97	396.03	1.86	206.67	0.46	306.67	14.74	31.95	1.56	208.0	0.24	160.0	16.40	321.56	1.64	205.0	0.27	180.0
7	23.19	399.82	2.10	233.33	0.52	346.67	16.41	34.46	1.71	228.0	0.25	166.67	17.32	339.60	1.80	225.0	0.31	206.67
8	24.64	424.82	2.35	261.11	0.59	393.33	17.31	367.51	1.82	242.67	0.27	180.0	18.87	370.1	1.96	245.0	0.35	233.33
9	26.29	453.27	2.60	288.89	0.66	440.	17.82	378.34	1.95	260.0	0.31	206.67	20.10	394.11	2.15	268.75	0.40	266.67

I = Minced meat "control".
II = Minced beef treated with 100 ppm sodium nitrite
III = Minced beef treated with 0.20% ascorbic acid and 50 ppm sodium nitrite.
T.V.N. = Total volatile nitrogen
T.M.A. = Trimethylamine.
T.B.A. = Thiobar bituric acid.

Table (7): The changes in PH values and Colour intemsity as an index of quality of minced beef samples (I,II and III) during fro3en storage at -20 C for 9 days.

Storage period (of days)	Treatments I PH value	I Colour intensity	II PH value	II Colour intensity	III PH value	III Colour intensity
0	6.00	0.710	6.00	0.710	5.95	0.710
1	5.95	0.700	5.96	0.706	5.90	0.708
2	5.90	0.696	5.94	0.698	5.90	0.700
3	5.90	0.673	5.42	0.685	5.87	0.694
4	5.93	0.654	5.90	0.680	5.84	0.688
5	5.98	0.634	5.90	0.678	5.85	0.679
6	5.96	0.613	5.93	0.664	5.88	0.672
7	6.00	0.600	5.95	0.656	5.90	0.667
8	6.0 2	0.594	5.97	0.639	5.94	0.660
9	6.0 5	0.582	5.99	0.621	5.97	0.647

I Minced beef. "control"
II Minced beef treated with 100 ppm sodium nitrite.
III Minced beef treated with 0.20 % ascorbic acid and 50 ppm sodium nitrite.
* Measured as optical density at 542 Mu.

Table (8): Comparative effect of cold storag at (4 °C) for 9 days of minced meat samples (I,II and III) on TBC, TBSC Pseudomonas sp., Staphylococcus aureus and coliform.

Storage period (days)	Treatments	T B C		T B S C		Pseudomons sp.		Staphylococcus aureus		Coliform group	
		Survivors X 10	Log survivors	Survivors X 10	Log survivors	Survivors X 10	Log survivors	Survivors X 10	Log survivors	Survivors X 10	Log survivors
0	I	4.10	4.61	6.60	2.22	4.60	1.66	8.30	1.92	N.I..	-
1		5.10	4.71	21.80	2.34	7.80	1.89	922	1.96	N.I..	-
2		6.25	4.80	26.69	2.43	10.50	2.02	10.00	2.00	N.I..	-
3		7.00	4.85	29.40	2.47	17.30	2.24	11.70	2.07	N.I..	-
4		8.41	4.92	33.75	2.53	31.00	2.49	13.20	2.12	N.I..	-
5		12.73	5.10	38.10	2.58	42.17	2.63	15.80	2.20	N.I..	-
6		16.36	5.21	44.50	2.67	63.60	2.80	18.90	2.28	N.I..	-
7		27.16	5.43	52.80	2.72	79.10	2.90	21.41	2.33	N.I..	-
8		35.10	5.54	61.30	2.79	95.21	2.98	24.63	2.39	N.I..	-
9		54.40	5.74	76.60	2.88	120.14	2.08	29.40	2.47	N.I..	-
0	II	0.52	3.72	1.60	1.20	0.93	0.97	5.20	1.72	N.I..	-
1		0.89	3.95	2.70	1.43	1.24	1.09	6.11	1.79	N.I..	-
2		1.20	4.08	4.20	1.62	3.14	1.50	7.50	1.88	N.I..	-
3		2.70	4.43	6.10	1.79	5.18	1.71	9.22	1.96	N.I..	-
4		4.55	4.66	9.12	1.96	7.70	1.89	11.00	2.04	N.I..	-
5		6.00	4.78	12.71	2.10	10.71	2.01	12.17	2.09	N.I..	-
6		7.22	4.86	14.84	2.17	18.44	2.26	14.00	2.15	N.I..	-
7		9.51	4.98	18.11	2.26	24.10	2.38	16.11	2.21	N.I..	-
8		11.00	5.04	22.93	2.36	30.20	2.48	18.00	2.26	N.I..	-
9		12.13	5.08	25.14	2.40	54.11	2.73	19.10	2.28	N.I..	-
0	III	1.10	4.04	4.30	1.63	1.10	1.04	7.20	1.86	N.I..	-
1		2.70	4.43	6.51	1.81	3.05	1.48	8.10	1.91	N.I..	-
2		4.11	4.61	8.12	1.91	5.76	1.76	9.40	1.97	N.I..	-
3		5.61	4.75	10.00	2.00	8.10	1.91	11.50	2.06	N.I..	-
4		7.22	4.86	13.20	2.12	11.30	2.05	13.12	2.12	N.I..	-
5		8.59	4.93	17.81	2.25	19.20	2.28	17.16	2.24	N.I..	-
6		10.10	5.00	20.40	2.31	26.40	2.42	19.40	2.29	N.I..	-
7		17.60	5.25	25.11	2.40	37.22	2.57	21.13	2.32	N.I..	-
8		23.10	5.36	32.70	2.51	51.90	2.72	23.00	2.36	N.I..	-
9		35.20	5.55	46.83	2.67	73.15	2.86	25.11	2.40	N.I..	-

I = Minced beef (control)

II = Minced beef treated with 100 ppm sodium nitrite.

III = Minced beef treated with 0.20% ascorbic acid and 50 ppm sodium nitrite.

T B C:Total bacterial count., T B S C: Total bacterial spores count

However , the treatment of 100 ppm Na NO_2 was an ideal concentration and samples were stable for long time at frozen condition. No evidence of bacterial spoilage or other deteriorative change could be detected at any time.

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تأثير بعض الاضافات الكيمائية علي خواص اللحم البقري اثناء التخزين تحت درجات حرارة منخفضة

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– أجريت هذه الدراسة لغرض معرفة تأثير اضافة بعض المواد الحافظة الكيميائية (نيتريت صوديوم ١٠٠ جزء في المليون ، نيتريت صوديوم ٥٠ جزء في المليون + ٠,٢٪ حمض أسكوربيك) علي الخواص الكيميائية والقيم الكيميائية الدالة علي الطزاجة والخواص الميكروبيولوجية للحم البقري المفروم اثناء التخزين بالتبريد علي ٤° م لمدة ٩ أيام وبالتجميد علي -٢٠° م لمدة ٨شهور .

وقد لوحظ الاتي :-

– بتقدير التركيب الكيميائي للعينات وجدانخفاض طفيف في نسبة الرطوبة ، البروتين ، الكربوهيدرات في حالة التخزين بالتجميد كما لوحظ زيادة نسبة الانخفاض في حالة التخزين بالتبريد في جميع المعاملات .

– وجد زيادة بسيطة في قيم النتروجين الكلي المتطاير (TVN) وثلاثي ميثايل أمين (TMA) . وحمض الثيوباربتيوريك (TBA) بزيادة فترة التخزين بالتجميد بالمقارنة بالعينات المخزنة بالتبريد .

– عند دراسة تأثير اضافة نيتريت الصوديوم بتركيزات مختلفة وحمض الاسكوربيك وجد أن هذه الاضافات تقلل من التغيرات في الخواص الكيميائية السابقة وأن أفضل المعاملات هي استعمال نيتريت صوديوم بنسبة ١٠٠ جزء في المليون .

– باجراء التحليلات الميكروبيولوجية (العدد الكلي للبكتريا) البكتريا المتجرثمة الهوائية ، بكتريا Pseudomonas SD ، بكتريا Staphylococcus aureus ومجموعة بكتريا القولون) ولوحظ نقص أعداد هذه الميكروبات بزيادة فترة التخزين بالتجميد وبأستعمال نيتريت الصوديوم بالمقارنة بعينات المقارنة "الغير معاملة" بينما لوحظ زيادة هذة الاعداد في حالة التخزين بالتبريد وكانت الزيادة أقل في حالة أستعمال نيتريت الصوديوم كما وجد ان افضل المعاملات هي التي تحتوي علي نيتريت صوديوم بنسبة ١٠٠ جزء في المليون .

– لوحظ انخفاض في درجة تركيز لون اللحم بزيادة فترة التخزين بالتبريد بالمقارنة بالعينات المجمدة كما أوت اضافة نيتريت الصوديوم وحمض الاسكوربيك الى تحسن فى درجة اللون والخواص الكيميائية كما أدت الي اختزال اعداد البكتريا .

– لوحظ في العينات المجمدة عدم ظهور أى دلالات للفساد البكتريولوجي أو أى تغيرات كيميائية أخرى أكتشف حتي نهاية فترة التخزين السابقة .