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

BY

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## ABSTRACT

Minced beef had been prepared with appropriate ingredients with addition of three levels of Na No $_2$  A100  $\rm gm$ . Zero level (control) besides 100  $\rm ppm$  Na No $_2$  and (50  $\rm ppm$  Na No $_2$  and 0.20 % ascorbic acid) were used in this study.

The end products weere packed in polyethelene bags and stored at -20 C for 3 months other treatments stored at 4 C for 3 days. Samples were withdrawn monthly and dialy to determine the following caramegiers: Moisture, protein, Lipids, Ashi carbohya rates total volatile nitrogen (T.V.N), Trymethy Lamine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); Starbylococcus 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% ascorbic acid.

However, the treatment of 100 ppm Na No, 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  $2^{\circ}$ c total count rose to a maximum of  $10^{8}/g$  after 8 weeks in sterile-packaged samples. Irrespective of meat £4, 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 cxide.

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 Scy 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 faster rate than of those by cryogenic methods.

This, study was carried out to determined the lowest effective concentration of Na No, 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

- 1- Materials: beef were purchased from local slaughter house and minced by meat grinder. During preparation of minced beef Na No<sub>2</sub> was added with O, 100 ppm and (50 ppm Na No<sub>2</sub>+0.2% ascorbic acid). The prepared minced beef were stored after packaging in poly etheline bags at 4C for 9 days and -20°C for 8 months. Samples were withdrawn daily and monthly for migrobiological and chemical evalution.
- II- Methods: Total bacterial count (TBC) was netermined 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

l- 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) showed 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 breakdo-own 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  $\boldsymbol{g}$  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 aurgus 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 Molatile 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 broakdown 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) Show 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 Vondekerckhave., (1979). and Salem. (1987).

Table (8) showed that the total bacterial counts, total bacterial spores counts, Pseudomonas sp. and staphylococus 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 (1,11 and III) during frozen storage at -20 C for 8 months.

2.5	A STATE OF THE PARTY OF THE PAR	Moistun	. %	Protein	n %	Lipide	*	\ sh	*	Carbohy	drates%
Storage period (days)	Treatments	ww	DW	ww	DW	ww	DW	ww	DW	ww	DW
tuays,	TROSTER N	NAME OF TAXABLE	1 74	18.88	60.44	10.40	33,30	0.91	2.22	1.05	3.34
0		68.76	0	1	60.23	10.48	33.46	0.93	2.97	1.05	3.34
1		68.66	0	18.88	60.23	10.58	33.65	0.95	3.03	1.04	3.32
2		68.56	0	18.87	59.96	10.62	33.74	0.96	3.05	1.02	3.25
3		68.52	9	19.88		10.66	33.82	0.97	3.08	1.01	3.19
4	apa herr	68.48	0	18.88	59.91	10.69	33.85	0.98	3.09	1.0	3.17
5		68.43	0	18,90	59.89	10.71	33.87	0.98	3.10	1.0	3.15
6		68.38	0+	18.93	59.88	10.73	33.90	0.99	3.12	0.99	3.12
7		68.34	0	18.95	59.86	10.76	33.96	0.99	3.13	0.99	3.11
8		68.31	0	18.95	59.80	10.76	33.70				
				18,01	60.44	9.92	33.30	0.87	2.22	1.0	3.34
0		70.20	0	18.07	60.40	9.97	33.33	0.88	2.94	1.0	3.33
1		70.08	0	18.07	60.22	10.04	33.48	0.89	2.98	1.0	3.32
2		70,00	0	18,07	60.10	m.n	33.59	0.90	3.91	0.99	3.30
3		69.94	0		60.02	10.14	33.68	0.91	3.03	0.98	3.27
4	II	69.90	0	18.07	59.97	10.17	33.77	0.92	3.05	0.97	3.21
5		69.87	0	18.07	59.94	10.21	33.83	0.92	3.05	0.96	3.18
6		69.82	0	18,09	59.90	10.23	33.87	0.93	3.07	0.95	3.16
7		69.80	, 0	18.09	59.87	10.25	33.89	0.93	3.09	0.95	3.16
8		69.77	0	18.10	34.87	W.23	33.0	22019			
		70,20	0	18.0 1	60.44	9.92	33.30	0.87	2.92	1.0	3.34
0			0	18.11	60.38	10.01	33.36	0.89	2.95	0.99	3.31
1		70.00	H M	18.09	60.21	10.06	33.50	0.90	2.99	0.99	3.30
2		69.96	Z FAME	18.06	60.07	10.11	33.63	0.91	3.02	0.99	3.28
3		69.93		18.06	60,00	10.14	33.70	0.92	3.04	0.98	3.26
4	111	69.90			59.96	10.18	33.79	0.92	3.05	0.96	3.20
5		69.87		18.07	59.90	10.22	33.86	0.93	3.07	0.96	3.17
6		69.82		18.07	59.86		33.90	0.94	3.10	0.95	3.1
7		69.80		18.07			33.95	0.94		0.94	3.13
8		69.78	3 0	18,08	59.82	11.20	33.75	BR V			

ww = wet weight basis, Dw = Dry weight basis.

<sup>1 :</sup> Minced meat (control).

II : Minced meat treated with 100 ppm sodium nitrite.

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

 <sup>:</sup> Other carbohydrates obtained by difference.

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( months	la la la		Value	100	Value	10	Value	*	Value		Value		1			1	1	192
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1.1 Minced mest (costrol)

| Minced mest (vested with DO pom molum mitrithmined mest vested with 0.3 % succession and 50 ppm

T.V.N: Total Volatile mitrogen

\* Measured as optical density at 542 Mu

1 : 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 (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.
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Storage			Treatments			
period ((months)	PH value	Colour intensity	II PH value	Colour	PH value	Colour
0	00.9	0.710	00.9	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
9	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	0.000	5.81	0.639	5.83	0.651

Table (4); Comparative effect of frozen storage at (-20 C) for 8 months of minced beef samples (I,II,and III) on total bacterial spores count (TBSC), seeudomonas sp. Sinphylococcus aureus and coliform-regroup.

Control   Cont	Storage		-	B C	TBS	2 C	Pseadon sp.	Pseadomons sp.	Rurets	COCCUE	group	d
4.10 4.61 16.87 2.22 4.81 1.56 8.30 1.22 2.25 4.47 1.56 8.30 1.22 2.25 4.47 1.2.10 2.08 4.12 1.61 7.53 1.53 1.53 2.27 1.447 6.00 1.78 3.40 1.53 6.12 1.79 1.25 2.20 4.47 6.00 1.78 3.40 1.53 6.12 1.79 1.74 2.00 1.52 2.20 4.41 4.00 1.52 2.20 1.74 1.20 1.52 1.52 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.50 1.74 1.74 1.74 1.74 1.74 1.74 1.74 1.74	period months)		Survivors	Log survivors	Survivors	Log	Survivors X D	Log	Survivors X D	Log survivors	Survivors X ID	Log
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2.97 2.97 2.77 4.43 6.00 1.86 3.66 1.56 6.65 1.87 2.78 4.43 6.00 1.78 6.00 1.78 2.79 6.43 6.00 1.78 6.12 1.79 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	0		4. N	4.48	12 10	2.08	4.12	1.61	7.53	1.53	N.L.	
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2. 60 4.32 2.40 1.40 3.14 1.50 3.81 1.58 2.00 2.00 4.32 2.40 1.40 3.14 1.50 3.81 1.58 2.00 1.80 0.90 2.89 1.46 2.73 1.44 1.40 1.80 0.90 0.90 1.32 1.44 2.6 0.90 0.90 1.32 1.44 2.6 0.90 1.32 1.45 1.15 0.80 0.90 0.90 4.56 1.65 1.65 0.41 3.51 1.20 0.90 0.90 0.90 0.90 1.72 1.20 0.41 3.52 1.23 1.00 0.70 0.82 1.90 1.60 0.70 0.82 1.90 1.60 0.70 0.70 0.82 1.90 1.40 0.70 0.70 0.70 0.70 0.70 0.70 0.70 0	4	-	2.33	4 3 4	2 30	1 53	3.24	1.51	4.65	1.67	N.I.	
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1,87	cı		3.00	25.0	9-1	1.38	3.04	1.48	2.73	1.44	N.L.	
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0.45 3.66 1.66 1.16 0.87 0.94 4.56 1.66 0.41 0.41 0.82 0.91 4.56 1.66 0.41 0.41 0.82 0.91 4.56 1.66 0.41 0.41 0.41 0.41 0.41 0.42 0.42 0.42 0.42 0.42 0.42 0.42 0.42					6	1.30	0 03	0.07	5.20	1.72	N.I.N	-
0.41 3.61 1.35 1.13 0.82 0.91 3.97 1.00 0.33 3.52 1.23 1.09 0.76 0.86 0.86 1.91 1.56 0.76 0.87 0.91 3.97 1.00 0.76 0.87 0.91 0.88 1.91 1.46 0.99 0.66 0.82 1.91 1.46 0.99 0.99 0.66 0.82 1.91 1.46 0.99 0.99 0.66 0.82 1.91 1.46 0.99 0.99 0.66 0.79 1.39 1.14 0.99 0.99 0.62 0.79 1.39 1.14 0.99 0.99 0.79 0.79 0.99 0.99 0.98 0.91 0.99 0.99 0.99 0.99 0.99 0.99 0.99	0		0.32	3.16	1.46	1.16	0.87	0.94	4.56	1.66	N.L.	
0.25 3.40 1.25 1.29 0.76 0.85 1.91 1.56 0.25 0.25 1.29 1.00 0.71 0.85 1.91 1.46 0.25 0.71 0.85 1.91 1.46 0.14 3.15 0.89 0.95 0.62 0.82 2.02 1.34 1.46 0.14 3.15 0.89 0.95 0.62 0.79 1.39 1.34 0.14 0.35 0.71 0.85 0.70 0.78 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.86 0.37 0.38 0.37 0.86 0.37 0.39 0.39 0.39 0.30 1.27 0.30 0.39 0.39 0.30 0.30 0.37 0.30 0.37 0.86 0.37 0.39 0.39 0.30 0.37 0.30 0.37 0.38 0.37 0.37 0.38 0.37 0.38 0.37 0.38 0.37 0.37 0.38 0.37 0.37 0.37 0.38 0.37 0.37 0.37 0.38 0.37 0.37 0.37 0.38 0.37 0.37 0.37 0.38 0.37 0.37 0.37 0.37 0.38 0.37 0.37 0.37 0.37 0.37 0.38 0.37 0.37 0.37 0.37 0.37 0.37 0.37 0.37	-			2 61	1 15	1 13	0.82	0.91	3.97	1.00	Z.L.	
0.25 3.40 1.00 1.04 0.71 0.85 1.91 1.46 1.89 1.91 1.46 1.89 1.91 1.46 1.89 1.99 0.99 0.66 0.82 2.02 1.31 1.40 1.99 0.99 0.66 0.82 2.02 1.31 1.31 1.40 1.31 1.40 1.40 1.40 1.40 1.40 1.40 1.40 1.4	7		0.33	3 42	1 23	1.00	0.76	0.85	3.64	1.56	z.z.	
1. IR 3.26 0.99 0.66 0.82 2.02 1.31 0.14 3.15 0.89 0.65 0.62 0.79 1.39 1.14 0.14 3.15 0.89 0.75 0.62 0.79 1.39 1.14 0.15 0.79 0.75 0.75 0.75 0.75 0.75 0.75 0.18 0.15 0.18 0.18 0.18 0.29 0.75 0.75 0.75 0.15 0.18 0.18 0.18 0.29 0.75 0.75 0.75 0.18 0.18 0.18 0.18 0.18 0.19 0.10 1.01 0.10 1.01 0.18 0.18 0.19 0.10 0.10 0.18 0.19 0.10 0.10 0.18 0.19 0.10 0.10 0.10 0.10 0.10 0.10 0.10		-	0 25	3.40	1.10	1.04	0.71	0.85	1.91	1.46	Z	
0.14 3.15 0.89 0.95 0.62 0.79 1.14 1.14 1.14 1.15 0.89 0.95 0.62 0.79 1.14 1.14 1.15 0.89 0.71 0.88 0.76 0.78 0.78 0.78 0.78 0.78 0.78 0.78 0.78			0 18	3.26	0.00	0.99	99.0	0.82	2.02	1.31	Z.Z.	
0.09 2.95 0.71 0.85 0.00 0.78 0.37 0.86 0.03 2.48 0.58 0.76 0.57 0.76 0.15 0.18 0.18 0.09 0.70 0.70 0.70 0.18 0.18 0.18 0.70 0.57 0.70 0.70 0.18 0.18 0.70 0.70 0.70 0.70 0.18 0.70 0.70 0.70 0.70 0.70 0.70 0.70 0.7			0 14	3 15	0.89	0.95	0.62	0.79	1.39	1.14	N.T.	
0.03 2.48 0.58 0.76 0.57 0.76 0.15 0.18 0.18 0.68 3.93 4.02 1.60 1.00 1.04 7.20 1.86 0.60 3.78 3.78 3.75 1.57 0.99 0.99 5.64 1.81 0.42 0.50 3.78 3.75 1.57 0.99 0.99 5.65 1.75 0.40 0.87 0.94 5.13 1.71 0.88 0.75 0.94 5.13 1.71 0.88 0.75 0.94 5.13 1.71 0.88 0.75 0.94 5.13 1.71 0.88 0.75 0.94 5.13 1.71 0.88 0.75 0.90 3.77 1.88 0.75 0.75 0.88 3.04 1.48 0.75 0.75 0.88 3.04 1.48 0.75 0.75 0.88 3.04 1.48 1.75 0.75 0.88 3.04 1.75 0.75 0.88 3.04 1.75 0.75 0.75 0.88 3.04 1.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0	10		000	2.05	0.71	0.85	0.00	0.78	0.37	0.86	Z.Z.	
1. pp 4.94 4.39 1.63 1.10 1.04 7.20 1.86 1.80 0.66 3.78 3.78 1.57 1.60 1.02 0.99 6.44 1.81 1.81 0.90 0.99 5.46 1.75 0.50 3.78 3.75 1.57 0.89 0.99 5.43 1.75 0.42 0.89 0.99 5.43 1.75 0.42 0.89 0.99 5.43 1.75 0.42 0.89 0.92 0.99 5.43 1.71 0.42 0.99 0.99 0.99 5.43 1.71 0.42 0.99 0.99 0.99 0.99 1.71 0.89 0.99 0.99 0.99 0.99 0.99 0.99 0.99	or or		0.03	2.48	0.58	92.0	0.57	0.76	0.15	0.18	N.I.:	2114
0.86 3.93 4.02 1.60 1.02 1.01 6.44 1.81 1.01 0.86 3.93 4.02 1.00 1.02 1.01 6.44 1.81 1.01 0.86 3.93 4.02 1.00 1.02 1.00 1.09 0.89 5.13 1.71 0.89 0.81 0.92 5.13 1.71 0.81 0.92 5.13 1.71 0.81 0.92 5.13 1.71 0.81 0.92 5.13 1.71 0.81 0.93 3.04 1.48 1.02 0.71 0.88 3.04 1.48 1.02 0.71 0.88 2.32 1.37 0.81 0.81 2.30 1.37 0.81 0.81 0.81 0.81 0.81 1.37 0.81 0.81 0.81 0.81 1.37 0.81 0.81 0.81 0.81 0.81 0.81 0.81 0.81	(		9	403	4 20	1 63	1 10	1.04	7.20	1.86	N.L.	-
0.60 3.78 3.75 1.57 0.99 0.99 5.66 1.75 1.70 0.60 0.60 3.70 3.70 3.70 1.49 0.87 0.99 0.99 5.66 1.75 0.60 0.60 0.81 0.94 5.13 1.71 0.88 0.83 0.92 5.13 1.71 0.88 0.83 0.92 5.13 1.71 0.88 0.85 0.70 0.80 3.77 1.58 0.79 0.70 0.80 3.77 1.68 0.71 0.88 3.04 1.48 0.71 0.88 2.70 1.70 0.81 1.70 0	O TO	THE OWNER WHEN	1. 1.	2 03	402	097	1.02	1.0.1	6.44	1.81	Z.Z.	-
0.50 3.70 3.70 1.49 0.87 0.94 5.13 1.71 0.50 0.50 0.50 0.50 0.50 0.50 0.50 0.5			0 0	3.78	3.75	1.57	66.0	0.99	2.66	1.75	Z.Z.	
0.42 3.62 2.42 1.38 0.83 0.92 5.13 1.71 0.15 0.15 0.15 0.15 0.15 0.15 0.15 0.1	7	111	05.0	3.30	3.10	1.49	0.87	0.94	5.13	1.71	Z	
3.54 2.23 1.35 0.79 0.90 3.77 1.58 3.45 2.10 1.32 0.71 0.88 3.04 1.48 1.48 1.27 0.71 0.85 2.32 1.48 1.31 1.20 0.71 0.85 1.51 1.21 1.21			0.42	3 63	2.42	1.38	0.83	0.92	5.13	1.71	N.C.	,
3.45 2.40 1.32 0.71 0.58 3.04 1.48 1.48 3.32 1.87 1.27 0.71 0.85 2.32 1.37 1.31 1.21 1.21			0 15	3.54	2.23	1.35	0.79	0.90	3.77	1.58	Z	
3.32 1.85 1.27 0.71 0.85 2.32 1.37 1.09 1.00 1.20 0.68 0.85 1.61 1.21			0.79	31.15	2.10	1.32	0.71	0.88	3.04	1.48	Z	
3.00 1.00 1.20 0.68 0.85 1.61 1.21			0 31	3 12	1.85	1.27	0.71	0.85	2 32	1.37	Z	
			0.13	300	1.00	1.20	89.0	0.85	197	1.21	Z.	

1 g Mincol book frontroll.

It a Mincol book noted with No ppm sodium nitrite.

It winced beef treated with 0.2% asorbic acid and 50 ppm Sodium nitrite.

Storage		Moisture	*	Protei	n %	Lipide	s %	Ash	×	Carbohy	drates
period (days)	Treatments	ww	DW	ww	D₩	ww	DW	ww	DW	ww	DW
		68.76	0	18.88	60.44	10.40	33.30	0.91	2.92	1.05	3.34
0		68.16	0	19.23	60.40	10.61	53.35	0.93.	2.93	1.05	3.32
1		67.33	0	19.73	60.78	10.91	33.41	0.96	2.93	1.07	3.28
2		66.73	0	20.05	60.28	11.17	33.56	0.98	2.95	1.07	3.21
3		66.15	0	20.34	60.11	11.45	33.82	1.01	2.98	1.05	3.09
4	1	65.65	0	20.62	60.04	11.67	33.96	1.03	2.99	1.03	3.01
5		65.14	0	20.85	59.82	11.90	34.15	1.07	3.06	. 1.04	2.97
6		64.90	0	20.96	59.73	12.01	34.21	1.09	3.11	1.04	2.95
7		65.52	0	21.17	59.66	12.16	34.28	L 12	3.16	1.03	2.90
8		64.00	0	21.41	59.48	12.42	34.49	L 15	3.19	1.02	1.84
9		01.00									
0		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	11	68.86	0	18.78	60.30	10.43	33.50	0.92	2.96	1.0 1	3.24
5		68.51	0	18.97	60.24	m.56	33.55	0.95	3.00	1.0 1	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
		70.20	c	18.01	60.44	9.92	33.30	0.87	2.92	1.0	3.34
0		69.81	0	18.24	60.42	10.06	33.32	0.88	2.92	1.01	3.34
1		69.70	0	18.30	60.39	10.10	33.35	0.90	2.96	1.0	3.30
2		69.40	0	18.46	60.32	10.22	33.41	0.92	2.99	1.0	3.28
3		69.12	0	18.61	60.28	10.34	33.47	0.93	3.02	1.0	3.23
4	m	68.84	0	18.75	60.17	10.46	33.58	0.95	3.05	1.0	3.20
5		68.23	0	19.09	60. D	10.71	33.70	0.98	3.08	0.99	3.12
6			0	19.14	59.87	10.87	33.99	1.0	3.12	0.97	3.02
7		68.02	0	19.43	59.78	11.09	34.13	1.02	3.13	0.96	2.96
8		67.50	0	19.63	59.66	11.27	34.25	1.04	3.17	0.96	2.92
9		67.10	0	17.03	37.00		435				THE I

ww = wet weight basis, Dw = Dry weight basis.

1 : Minced beef (control)

11 : 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.

								T read meants	5386			*					
S former	No.			50			28.5	13		N. A.			20 20	B	-		
107	T.V.N.	1.	T.M.A.	T.	T.R.A.	T.V.N.	4.	TMA.	A.	TBA		T.V.N.	z,	T.M.A.	3	T.B.A.	4
Value	,	Value	M	Value	*	Value		Vales	*	Value	*	Velue	*	Value	*	Value	
0 1.4				0.15	8	4.71	8	0.75	8	0.15	80	3.10	80	0.00	3	0.15	18
1 7.0	D 156.89	9	116.67	0.17		7.10	150.74	0.95	136.67	0.16	D6.67	6.20	160.78	0.97	12.23	91.0	D6.67
7 13.2				0.30	113.33	9.72	206.36	100	0'01	0.17	10.33	100	196.27	117	138.75	0.18	700
1 16.4				0.23		19.0	225.90	1.14	152.0	0.19	126.67	11.50	225.49	1.23	153.75	0.70	133.33
4 18.1		157		0.37		13.11	257.11	173	164.0	0.10	133.33	13.30	260.78	173	171.25	0.23	153.33
C				0.14		10.22	280.67	1734	178.67	0.22	146.67	14.70	288.23	1.40	186.25	0.25	
4 22.07	9		-	0.46		14.74	11.95	1.56	208.0	0.34	0 091	16.60	321.56	1	0.500	0.17	1000
. 21.1	18,001 P	2.80	100	0.37		16.41	14.46	1.71	228.0	0.25	166.67	17.12	319.60	1.80	225.0	0.31	20 6.67
. 34.4			200	0.50		17.31	167.51	1.82	242.67	0.27	0 011	18.87	1.01	1.96	245.0	0.31	213 33
0 26.70		1.60	-	0.66		17.82	178.34	1.99	260.0	0.31	200.67	8.0	394.11	2.15	268.75	0.0	200.67

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.

6.00 0.7 10 6.00 0.7 10 5.95 5.90 0.609 5.90 0.609 5.90 0.673 5.94 0.698 5.90 5.94 0.688 5.90 5.94 0.688 5.90 0.654 5.90 0.613 5.90 0.664 5.88 6.00 0.600 5.95 0.664 5.88 6.00 0.600 5.95 0.656 5.90 6.05 0.656 5.90 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.95 0.600 5.90 0.601 5.97	Storage	The party of the p		Treatments			
0.710 6.00 0.710 5.95 0.700 5.96 0.706 5.90 0.696 5.94 0.698 5.90 0.673 5.42 0.685 5.87 0.654 5.90 0.685 5.87 0.634 5.90 0.678 5.85 0.600 5.95 0.664 5.88 0.594 5.97 0.639 5.94 0.582 5.99 0.621 5.97	period (days)	PH value	I Colour intensity	PH value	Colour	value	Colour
0.710 0.00 0.700 5.96 0.706 5.90 0.696 5.94 0.698 5.90 0.673 5.42 0.685 5.87 0.654 5.90 0.680 5.84 0.634 5.90 0.678 5.85 0.613 5.93 0.664 5.88 0.600 5.95 0.656 5.90 0.594 5.97 0.639 5.94	2000			007	0,10	20 2	0 710
0.700 5.96 0.706 5.90 0.696 5.94 0.698 5.90 0.673 5.42 0.685 5.87 0.654 5.90 0.680 5.84 0.634 5.90 0.678 5.85 0.613 5.93 0.664 5.88 0.600 5.95 0.656 5.90 0.594 5.97 0.639 5.94	0	00.9	0.710	00.0	0.7.0	2.73	011.0
0.696 5.94 0.698 5.90 0.673 5.42 0.685 5.87 0.654 5.90 0.680 5.84 0.634 5.90 0.678 5.85 0.613 5.93 0.664 5.85 0.600 5.95 0.656 5.90 0.594 5.97 0.639 5.94 0.582 5.99 0.621 5.97	, -	5 95	0.700	5.96	902.0	2.90	0.708
0.673 5.42 0.685 5.87 0.654 5.90 0.680 5.84 0.634 5.90 0.678 5.85 0.613 5.93 0.664 5.88 0.600 5.95 0.656 5.90 0.594 5.97 0.639 5.94 0.582 5.99 0.621 5.97	, (	88.5	969 0	5.94	869.0	5.90	0.700
0.654 5.90 0.680 5.84 0.634 5.90 0.678 5.85 0.613 5.93 0.664 5.85 0.600 5.95 0.656 5.90 0.594 5.97 0.639 5.94 0.582 5.99 0.621 5.97	1 "	200	673	5.42	0.685	5.87	0.694
0.613 5.90 0.678 5.85 0.613 5.93 0.664 5.88 0.600 5.95 0.656 5.90 0.594 5.97 0.639 5.94 0.582 5.99 0.621 5.97	0 <	5 03	0.654	2.00	0.680	5.84	0.688
0.600 5.95 0.664 5.88 0.600 5.95 0.656 5.90 0.594 5.97 0.639 5.94 0.582 5.99 0.621 5.97	tu	5 00.	0.634	2 00	0.678	5.85	0.679
0.594 5.97 0.636 5.94 0.582 5.99 0.621 5.97	2	2 06	0 613	5.93	0.664	5.88	0.672
0.594 5.97 0.639 5.94 0.582 5.99 0.621 5.97	70	00.5	009 0	5.95	0.656	5.90	0.667
0.582 5.99 0.621 5.97	- α	60.0	0 594	5.97	0.639	5.94	099.0
	00	6.0 5	0.582	5.99	0.621	5.97	0.647

Minced beef treated with 100 ppm sodium nitrite.
Minced beef treated with 0.20 % ascorbic acid and 50 ppm sodium nitrite.
Measured as optical density at 542 Mu. \_= E \*

Table (8): Comparative effect of cold storag at (4 C) for 9 days of minced meat samples (1,11 and 111) on TBC, TBSC

Survivors X D survivors T Log Survivors Log Survivors Log Survivors S.10 4.0 4.6 1 6.60 2.22 4.60 1.89 922 1.96 N.0 5.10 4.89 2.6.59 2.43 10.50 2.22 10.50 2.00 N.0 1.89 922 1.96 N.0 1.99 0.99 2.49 1.90 2.00 N.0 1.90 0.99 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 2.40 1.90 0.90 0.90 0.90 0.90 0.90 0.90 0.9	period	Treatments		2 8	T B	SC	Pseadomons sp.	mons	Stanhylncoccus	ococcus us	Coliform	E
4.61 6.60 2.22 4.60 1.66 8.30 1.92 N.L. 4.83 2.54 1.89 922 1.96 N.L. 4.85 2.54 1.89 922 1.96 N.L. 4.85 2.54 1.89 922 1.96 N.L. 4.92 1.3.75 2.53 1.90 2.00 1.00 2.00 N.L. 4.92 1.3.75 2.53 1.90 2.24 11.70 2.00 1.00 2.00 N.L. 5.14 5.28 1.89 2.24 11.70 2.28 1.89 2.12 N.L. 5.74 6.130 2.77 9.10 2.99 2.44 2.12 N.L. 5.74 76.60 2.77 9.5.21 2.98 2.463 2.39 N.L. 4.98 4.20 1.20 1.20 0.93 0.97 5.20 1.72 N.L. 4.98 4.20 1.70 1.20 0.99 5.18 1.70 1.70 N.L. 4.98 1.21 1.24 1.00 5.20 1.89 N.L. 4.98 1.27 2.93 2.44 1.00 2.04 N.L. 4.98 1.27 2.93 2.48 1.00 2.04 N.L. 4.99 1.27 2.93 2.48 1.00 2.04 N.L. 4.99 1.27 2.93 2.48 1.00 2.21 1.00 2.21 1.00 2.04 N.L. 4.99 1.20 1.80 1.20 2.20 1.20 N.L. 4.99 1.20 2.20 1.20 1.20 N.L. 4.99 1.20 2.20 1.20 2.20 1.20 N.L. 4.99 1.20 2.20 1.20 2.20 1.20 N.L. 4.99 1.20 2.20 1.20 2.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 1.20 0.20 0	ich i		Survivurs X X	Log	Survivors X ID	THE TARGET	Survivors X ID	Log	Survivors X 10	Log	Sun	Log
4.71 21.89 2.34 7.00 1.66 8.30 1.92 4.89 2.6.99 2.41 21.89 2.6.99 2.20 1.96 4.89 2.43 10.50 2.02 2.02 2.02 33.74 2.5.3 10.50 2.02 2.02 2.03 33.74 2.5.3 11.30 2.24 11.30 2.02 2.02 2.03 2.03 2.03 2.03 2.03 2	6-		4.10	4.61	6.60	333		-				BULMINO
4.89         26.59         2.47         7.89         1.89         922         1.95           4.87         2.9.49         2.47         17.50         2.02         1.00         2.00           5.2.1         33.75         2.53         31.00         2.49         19.20         2.02           5.2.1         44.50         2.67         63.00         2.89         18.80         2.22           5.5.4         64.30         2.67         79.10         2.89         18.80         2.28           5.5.4         61.30         2.79         95.21         2.89         24.63         2.39           5.74         76.60         2.88         120.14         2.98         24.63         2.39           4.08         4.08         1.00.14         2.09         2.47         1.79           4.08         4.20         1.62         3.14         1.20         2.47           4.08         4.20         1.62         3.14         1.20         2.47           4.08         4.20         1.62         3.14         1.20         2.47           4.08         4.20         1.63         3.14         1.20         2.40         2.44           4.08			5.10	4.71	21 80	77.7	4.00	1.66	8.30	100		
4.65 2.0.9 2.43 10.50 2.02 10.0 2.02 10.0 2.03 3.7 5.24 10.50 2.04	7		6.25	4 90	27.70	7.34	7.80	1.89	022	70.1	N.L	,
4.75         2.9,40         2.47         17.30         2.24         17.30         2.24         17.30         2.24         17.30         2.74         17.30         2.74         17.30         2.75         3.00         2.75         3.00         2.75         3.00         2.75         3.00         2.75         3.00         2.75         3.00         2.75         3.00         2.75         3.75         2.75         3.75         2.75         3.75         3.75         2.70         3.75	3		200	100	40.07	2.43	10.50	200	200	1.70	N.L.	
4,92         33.75         2.53         31.00         2.64         11.70         2.07           5,54         64.20         2.78         42.17         2.63         15.80         2.12           5,544         61.30         2.72         79.8         2.80         2.14         2.28           5,544         61.30         2.72         79.8         2.80         2144         2.28           5,544         61.30         2.79         95.21         2.98         24.63         2.33           6,70         1.20         1.20         1.20         2.49         2.46         2.47           3,75         1.60         1.20         1.24         1.09         2.47         2.47           4,08         4.20         1.62         3.14         1.29         2.47         1.79           4,08         4.20         1.62         3.14         1.20         5.50         1.86           4,08         4.78         1.70         1.84         1.70         2.04         1.70           4,09         1.10         1.20         3.14         2.26         1.10         2.26           4,08         1.11         2.25         2.41         2.26	4		0 41	4.83	29.40	2.47	17 30	3 2 2	00.00	2.00	N.	
5. 10 38. 10 2.58 42.17 4.49 13.20 2.12 5.54 44.50 2.70 2.80 18.70 2.20 2.54 5.54 61.30 2.79 95.21 2.80 21.41 2.33 2.39 5.74 76.60 2.79 95.21 2.90 21.41 2.33 2.39 2.74 76.60 2.79 95.21 2.90 21.41 2.33 2.39 2.74 76.60 2.70 12.01 2.90 21.41 2.20 2.40 2.40 2.47 2.80 2.70 1.60 1.70 1.70 1.70 1.70 1.70 1.70 1.70 1.7	2	No other Division of	15.0	4.02	33.75	2.53	2100	67.7	2.11	2.07	Z	9
5.21 44.50 2.70 42.17 2.63 15.80 2.20 5.40 45.50 5.40 2.80 2.80 2.80 2.80 2.80 2.80 2.80 2.8	,	THE PERSON NAMED IN	17.73	5.10	38 10	2000	CATTO	5.46	13.20	2.12	N	0
5.43 5.73 7.72 79.10 2.80 18.90 2.20 5.54 61.30 2.72 79.10 2.80 18.90 2.73 3.35 2.39 2.5.4 61.30 2.72 79.10 2.80 21.41 2.33 2.39 2.5.4 61.30 2.72 79.10 2.80 21.41 2.33 2.39 2.5.4 76.60 2.72 1.60 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.2	0 1		16.36	5.21	44 60	6.30	42.17	2.63	15.80	2 30		
5.74 5.60 2.72 99.10 2.90 21.41 2.39 3.72 1.60 2.79 99.21 2.90 24.63 2.39 3.35 2.39 3.35 2.39 2.46 3.29 2.40 2.47 1.60 2.70 1.60 2.47 1.60 2.70 2.70 2.70 1.60 2.70 2.70 2.70 2.70 2.70 2.70 2.70 2.7	-		27.16	5 43	06.44	79.7	63.00	2.80	18 00	8:50	N.I	
5.74 76.60 2.79 95.21 2.98 24.71 2.33 2.47 4.36 2.47 2.48 120.14 2.08 29.40 2.47 2.47 4.48 4.20 1.43 1.24 1.09 6.11 1.79 1.44 4.30 1.27 2.09 6.11 1.79 1.44 4.30 1.27 2.09 6.11 1.79 1.44 4.30 1.27 2.09 6.11 1.79 1.44 4.30 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.2	38		35 10	6.64	27.80	2.72	79.10	2 90	21.41	97.7	N.L.	
3.72 1.00 1.20 0.93 0.97 5.20 1.72 1.00 1.43 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.24 1.09 6.11 1.79 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.20	0		54 40	1	01.30	2.79	95.21	2 00	24.71	2.33	N.I.	
3.72 1.00 1.20 0.93 0.97 5.20 1.72 1.00 1.09 0.91 0.97 5.20 1.72 1.00 1.09 0.97 5.20 1.72 1.00 1.09 0.97 5.20 1.72 1.00 1.09 0.11 1.79 1.00 1.09 0.11 1.79 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.0				5.14	76.80	2.88	120.14	200	20.40	2.39	N.L.N	
3.72 1.00 1.20 0.93 0.97 5.20 1.72 1.00 4.08 6.10 1.72 1.00 1.03 1.04 1.09 6.11 1.79 1.00 4.08 6.10 1.72 1.00 4.08 6.10 1.72 1.00 4.08 1.2.1 1.00 7.50 1.88 1.00 1.00 1.00 1.00 1.00 1.00 1.0	1)		0 63				The same	00.4	47.40	2.47	N.L.	
3.95         2.70         1.43         1.24         0.37         5.20         1.72           4.08         4.20         1.62         3.14         1.50         7.50         1.79           4.08         6.12         1.96         7.70         1.89         7.50         1.89           4.78         12.71         2.70         1.81         1.20         1.20         1.10           5.04         22.93         2.36         24.70         2.01         12.17         2.04           4.78         18.11         2.26         24.70         2.21         12.17         2.15           5.04         22.93         2.36         30.20         2.38         16.11         2.21           5.04         22.93         2.36         30.20         2.38         16.11         2.21           5.08         25.14         2.40         54.11         2.73         19.10         2.28           4.04         4.30         1.63         1.70         2.73         19.00         2.28           4.61         8.12         1.91         5.76         9.40         1.91         1.91           4.75         10.00         2.00         8.70         1.92	-		70.00	3.72	1.00	1.20	0 03	200				
4.08 4.20 1.52 1.24 1.09 6.11 1.79 4.48 6.10 1.79 5.18 1.70 1.89 4.49 4.50 1.70 1.70 1.80 1.80 1.80 4.48 12.71 2.10 10.71 2.10 1.20 1.90 1.00 2.04 4.98 18.11 2.26 24.10 2.38 16.11 2.21 5.04 22.93 2.36 30.20 2.38 16.11 2.21 5.40 2.41 2.40 2.40 2.20 1.80 4.43 4.30 1.63 1.70 1.04 7.20 1.86 4.43 4.30 1.63 1.70 1.04 7.20 1.86 4.43 6.51 1.81 3.05 1.48 8.10 1.91 4.75 10.00 2.00 8.70 1.91 1.150 2.00 4.93 17.81 2.25 11.30 2.05 11.12 2.12 5.00 2.04 4.30 1.30 2.05 11.12 2.12 5.00 2.04 4.30 1.30 2.05 11.12 2.12 5.00 2.04 2.30 1.30 2.35 11.12 2.12 5.00 2.30 2.31 2.30 2.31 2.31 2.31 2.31 2.31 2.31 2.31 2.31	,		08.6	3.95	2.70	1 43	6.73	0.97	5.20	1.72	- 2	
4.43 6.10 1.79 5.14 1.50 7.50 1.88 4.66 9.12 1.96 7.70 1.89 1.71 9.22 1.96 4.78 1.27 1.96 1.70 2.04 4.86 14.74 2.17 18.44 2.20 11.71 2.01 12.17 8.44 2.26 14.00 2.15 5.04 22.93 2.36 30.20 2.48 18.01 2.21 5.04 4.30 1.63 1.70 2.48 18.00 2.28 4.43 6.51 1.81 3.05 1.80 1.91 1.91 1.92 1.90 2.28 4.43 6.51 1.81 3.05 1.80 1.91 1.91 1.90 2.06 4.48 6.18 1.91 1.91 1.90 2.06 4.98 1.30 2.00 8.70 1.91 1.150 2.06 4.98 1.30 2.00 8.70 1.91 1.150 2.06 4.98 1.30 2.12 1.92 2.25 1.30 2.31 26.40 2.32 1.31 26.40 2.32 1.31 2.32 2.33 2.33 2.33 2.33 2.33			1.20	4.08	4.20	1.63	1.24	1.09	6.11	1.70	2	
4.66 9.12 1.77 5.18 1.71 9.22 1.96 4.78 12.71 2.10 10.71 2.01 4.98 18.11 2.10 10.71 2.01 4.98 18.11 2.10 10.71 2.01 5.04 22.73 2.36 24.10 2.38 16.11 2.21 5.04 22.73 2.36 30.20 2.48 18.00 2.26 4.04 4.30 1.63 1.10 2.73 19.70 2.28 4.04 4.30 1.63 1.10 1.04 7.20 1.86 4.01 8.12 1.91 5.76 1.48 8.10 1.91 4.75 10.00 2.00 8.10 1.91 11.50 2.06 4.98 13.20 2.12 11.30 2.05 13.12 2.12 5.00 20.40 2.31 26.40 2.32 17.16 2.24 5.35 2.31 2.40 37.22 2.37 2.13 2.32 5.35 3.370 2.31 2.40 37.22 2.35 5.55 4.68 3.26 2.31 2.32 2.33		Make, of the	2.70	4.43	2	70.1	3.14	1.50	7.50	1 88		
4.78 12.71 2.70 1.89 11.00 2.04 4.78 12.01 12.17 2.09 11.00 2.04 4.78 12.71 18.44 2.01 12.17 2.09 2.04 4.98 18.11 2.26 24.10 2.36 14.00 2.15 5.08 22.49 2.36 30.20 2.48 18.00 2.22 4.00 54.11 2.73 19.70 2.28 14.43 6.51 1.81 3.05 14.48 8.10 1.91 4.43 6.51 18.13 3.05 14.48 8.10 1.91 4.75 10.00 2.00 8.10 1.91 11.50 2.06 4.93 17.81 2.22 19.20 2.06 4.93 17.81 2.25 19.20 2.05 19.20 2.37 2.31 26.40 2.22 19.40 2.32 17.8 5.35 2.31 26.40 2.35 2.31 26.40 2.35 2.31 26.40 2.35 2.31 2.32 17.30 2.35 2.31 2.32 17.30 2.35 2.35 17.30 2.35 2.35 17.30 2.35 2.35 17.30 2.35 2.35 2.35 2.35 2.35 2.35 2.35 2.35		-	4.55	4.66	250	1.79	5.18	1.71	9.22	1 04		
4.86 14.71 2.70 10.71 2.01 12.17 2.02 4.86 14.71 2.76 24.70 2.36 14.00 2.15 5.04 22.93 2.36 24.70 2.38 16.11 2.21 5.08 25.14 2.40 54.11 2.73 19.00 2.28 4.04 4.30 1.63 1.70 1.04 7.20 1.86 4.43 6.51 1.81 3.05 1.48 8.10 1.91 4.75 10.00 2.00 8.10 1.91 11.50 2.06 4.38 11.20 2.05 11.15 2.06 4.39 17.81 2.25 19.20 2.05 13.12 2.12 5.00 20.40 2.31 26.40 2.42 19.40 2.29 5.35 25.11 2.40 37.22 2.37 2.113 2.32 5.55 46.83 2.67 33.15 2.32 2.35 10.30 2.36	•		6.00	4 78	13.7.	1.96	2.7	1.89	11.00	30.4		
4.89 18.14 2.17 18.44 2.26 14.01 2.18 5.04 22.93 2.36 30.20 2.38 16.11 2.21 5.04 22.93 2.36 30.20 2.38 16.11 2.21 5.04 22.93 2.36 30.20 2.38 16.11 2.21 5.04 22.93 2.36 30.20 2.38 16.11 2.21 5.00 2.38 16.11 2.21 16.10 2.38 16.11 2.39 16.11 2.21 16.11 2.30 16.11 2.30 16.11 2.30 16.11 2.30 16.11 2.30 16.11 2.30 16.11 2.30 16.11 2.30 16.11 2.30 16.11 2.30 17.22 2.32 17.31 2.30 2.32 17.31 2.30 2.32 17.31 2.30 2.33 17.31 2.31 2.31 2.32 17.31 2.32 17.31 2.32 17.31 2.33 17.31 2.31 2.32 17.31 2.32 17.31 2.33 1	9		7 22	00.4	17.71	2.10	10.71	201	12 13	60.7	N.I.	
4.98         18.11         2.26         24.10         2.38         16.11         2.21           5.08         22.93         2.36         30.20         2.48         16.11         2.21           4.04         4.30         1.63         1.70         2.48         16.11         2.21           4.04         4.30         1.63         1.70         2.28         1.81         2.28           4.04         4.31         1.63         1.70         2.28         1.91         2.28           4.01         8.12         1.81         3.05         1.48         8.10         1.91           4.75         8.00         2.00         8.70         1.91         1.91         1.91           4.75         8.00         2.00         8.70         1.91         1.91         1.91           4.75         8.00         2.00         8.70         1.92         2.06         1.97           4.98         13.20         2.21         10.20         2.21         1.94         2.24           5.99         2.90         2.90         2.90         2.24         1.86         2.24           5.75         2.57         2.17         2.31         2.25         2	7		150	4.80	14.84	2.17	18.44	2 26	14.00	500	Z.T.	
5.04 22.93 2.36 30.20 2.48 18.01 2.21 4.04 4.30 1.63 1.70 2.48 18.00 2.26 4.43 6.51 1.81 3.05 1.48 8.10 2.28 4.61 8.10 2.00 8.10 1.04 7.20 1.86 4.45 10.00 2.00 8.10 1.91 11.50 2.06 4.93 17.81 2.25 19.20 2.06 11.30 2.05 11.15 2.06 4.93 17.81 2.25 19.20 2.28 17.16 2.24 5.06 2.06 4.00 2.00 8.10 1.91 11.50 2.06 4.00 2.00 8.10 1.00 2.00 8.	8		1100	9.78	18.11	2.26	24.10	2 30	Mrki	2.15	N.I.	
5.08 25.14 2.40 54.11 2.73 19.00 2.26 4.04 4.30 1.63 1.10 1.04 7.20 1.86 4.43 6.51 1.81 3.05 1.48 8.10 1.91 4.75 10.00 2.00 8.10 1.77 9.40 1.91 4.86 13.20 2.12 11.30 2.05 4.93 17.81 2.25 19.20 2.28 17.16 2.24 5.50 20.40 2.31 26.40 2.42 19.40 2.24 5.45 35.11 2.40 37.22 2.57 21.13 2.32 5.55 46.83 2.67 33.15 2.57 21.13 2.32 5.55 46.83 2.67 33.15 2.57 21.13 2.32 5.55 5.55 5.55 5.50 2.51 2.52 2.32 5.55 5.55 5.55 5.50 2.32 5.32 5.33	6	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1000	5.04	22.93	2.36	30 30	6.30	10.11	2.21	N.L.	
4.04 4.30 1.63 1.70 1.04 7.20 1.86 1.43 6.51 181 3.05 1.48 8.10 1.91 7.20 1.86 1.91 7.20 1.86 1.91 7.91 1.91 1.91 7.91 1.91 1.91 7.91 1.91 7.91 1.91 7.91 7		THE PERSON NAMED IN	17.13	5.08	25.14	2.40	54 11	25.7	18.00	2.26	N.I.	
4.04 4.30 1.63 1.70 1.04 7.20 1.86 4.43 6.51 1.81 3.05 1.48 8.70 1.91 4.75 10.00 2.00 8.70 1.91 11.50 2.06 4.93 17.81 2.25 19.20 2.78 13.12 2.12 5.00 2.04 13.20 2.35 13.12 2.12 5.00 2.36 13.12 2.12 5.00 2.36 13.12 2.12 5.35 25.11 2.40 37.22 2.37 21.13 2.39 7.35 5.55 46.83 2.57 33.15 2.35 7.35 5.35 7.35 7.35 7.35 7.35 7.35 7	6						71.11	2.13	19.10	2.28	N.L.	
4.43 6.51 183 1.70 1.04 7.20 1.86 4.61 8.12 1.91 3.05 1.48 8.10 1.91 4.75 10.00 2.00 8.10 1.91 11.50 2.06 4.93 17.81 2.25 19.20 2.28 17.16 2.24 5.00 20.40 2.31 26.40 2.28 17.16 2.24 5.12 25.11 2.40 37.22 2.57 21.13 2.35 5.55 46.83 2.67 73 18 2.72 2.300 2.36	-		N.1	4.04	4.30	169	-					
4.61 8.12 1.81 3.05 1.48 8.10 1.91 4.75 10.00 2.00 8.10 1.91 1.50 2.06 1.97 4.86 13.20 2.10 8.10 1.91 1.50 2.05 4.98 13.20 2.12 11.30 2.05 13.12 2.12 5.00 20.40 2.31 26.40 2.24 19.40 2.32 5.11 2.40 37.22 2.57 21.13 2.35 5.55 46.83 2.67 73.14 2.75 2.30 2.35			2.70	4.43	139	1.03	1.10	1.04	7.20	1 86	N. I.	
4.75 0.00 2.00 8.76 1.76 9.40 1.97 4.45 10.00 2.00 8.10 1.97 11.50 2.05 4.93 11.81 2.25 11.30 2.05 13.12 2.12 5.00 2.04 11.50 2.05 13.12 2.12 5.00 2.04 11.50 2.05 13.12 2.12 5.00 2.04 11.50 2.05 13.12 2.12 5.05 2.04 2.00 2.00 2.00 2.00 2.00 2.00 2.00	,		4.11	4.61	8 13	1.01	3.05	1.48	8.10	101	N. I.	
4.93 17.81 2.22 18.30 2.06 4.93 17.81 2.25 19.30 2.24 2.45 2.45 2.45 19.30 2.48 17.16 2.24 2.45 2.45 2.45 19.30 2.48 17.16 2.24 2.45 2.45 19.30 2.45 2.45 2.45 19.30 2.45 2.45 2.45 19.30 2.45 2.45 2.45 2.45 2.45 2.45 2.45 2.45			5.61	4 75	71.0	1.91	5.76	1.76	0 40	101	N.L.	
4.90 13.80 2.12 11.30 2.05 11.30 2.06 11.50 2.00 2.00 2.00 2.00 11.50 2.00 2.00 11.50 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2	4	III	7 23	100	00.00	2.00	8.10	101	11 50	1.71	N.T.	
4.93 17.81 2.25 19.20 2.28 17.16 2.24 5.50 20.40 2.31 26.40 2.42 19.40 2.24 5.25 5.36 2.37 21.13 2.37 5.36 46.83 2.67 73.18 2.72 23.00 2.36	2		8 50	4.00	13.20	2.12	11.30	205	11.30	90.7	N.I.	
5.50 20.40 2.31 26.40 2.42 17.10 2.24 5.25 25.11 2.40 37.22 2.57 21.13 2.32 5.55 46.83 2.67 73 15 2.55 23.00 2.36	9	THE REAL PROPERTY.	01	4.93	17.81	2.25	19.20	2 28	13.12	2.12	N.L.	
5.25 25.11 2.40 37.22 2.37 21.13 2.39 5.55 46.83 2.67 73.19 2.72 2.30 2.36	7		7 (1)	00.0	20.40	2.31	26.40	2 43	17.10	2.24	N.I.	
5.36 32.70 2.51 51.90 2.72 23.00 2.36 5.35 46.83 2.67 73 15 2.02 23.00 2.36	8		2 20	5.25	25.11	2.40	37 22	3 6.7	17.40	5.29	N.L.	,
5.55 46.83 2.67 73 15 2.95 23.00 2.36	0	1	20.10	5.36	32.70	2.51	5190	2 2 2 2	21.13	2.32	Z.I.	
			10.0	5.55	46.83	77.	73 16	71.7	73.00	2.36	- 2	

1 = Mineral boof (control)

Il a Minced beef treated with 100 ppm sedium nirtie,

III 2 Minced beef treated with 0.20% ascorbic acid and 50 ppm sodium nitrite,

T B.C.Toral becreaist count, T R S C: Total bottetial spores count

However, the treatment of 100 ppm Na No 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 على خواص اللحم البقري اثناء التخزين تحت درجات حرارة منخفشة

#### حسن حسن خلف

قــــم علوم الاغدية \_ كلية الزراعة بشتهر. \_ جامعة الزقاريق

أجريت هذه الدرامة لغرض معرفة تأثير اضافة بعض المواد الحافئ \_\_\_\_\_ الكيميائية (نبتريت صوديوم ٥٠ جـ\_\_ ٠٠ في المليون ، نيتريت صوديوم ٥٠ جـ\_ ٠٠ في المليون + ٢٠٠٪ حمض أحكوربيك ) على الخواص الكيميائية والقيال الكيميائية الدالة على الطزاجة والخواص الميكوبيولوجية للحم البقري المفروم اثناه التخزين بالتبريد على أم لمدة ١ أيام وبالتجميد على -٣٠ م لمدة ٨شهور ٠٠

وقد لوحظ الاتي :-

\_ بتقدير التركيب الكيميائي للعينات وجدانخفاض طفيف في نسبة الرطوب ؟ البروتين ، الكربوهيدرات في حالة التخزين بالتجميد كما لوحظ ويادة نسبية الانخفاض في حالة التخزين بالتبريد في جميع المعاملات ،

- وجد زيادة بسيطة في قيم النتروجين الكلي المتطاير (TVN) وثلاث ي ميثايل أمين (TMA) ، وحمض الثيوباربتيوريك (TBA) بزيادة فت بيوة. التخزين بالتجميد بالمقارنة بالعينات المخزنة بالتبريد .

- عند دراسة تأثير اضافة نيتريت الصوديوم بتركيزات مختلفة وحمصيض الاسكوربيك وجد أن هذه الاضافات تقلل من التغيرات في الخواص الكيميائينة السابقة وأن أفضل المعاملات هي استعمال نيتريت صوديوم بنسبة ١٠٠ جز، فصيحى المليون •

باجراء التحليلات الميكروبيولوجية (العدد الكلي للبكتريا ) البكتريا المتجرتمة الهوائية ، بكتريا <u>Pseudomonas so</u> بكتريا <u>Staphylococcus</u> بكتريا <u>Pseudomonas so</u> معدود التحريد بالتجميد وبأستعمال نيتريت المسوديوم بالمقارنة بعينات المقارنة الفير معاملة بينما لوحظ زيادة ملة الاعداد في حالة التخزين بالتبريات وكانت الزيادة أقل في حالة أستعمال نيتريت المصوديوم كما وجد ان افضيال المعاملات مي التي تحتوي على نيتريت صوديوم بنسبة ١٠٠ جز، في المليون .

\_ لوحظ انخفاض في درجة تركيز لون اللحم بزيادة فترة التخزين بالتبريـــــــــ بالمقارنة بالعينات المجمدة كما أوت اضافة نيتريت الصوديوم وحمض الاسكوربيك الني تحسن في درجة اللون والخواص الكيميائية كما أوت الى اختزال اعـــــداد البكتريا .

لوحظ في العينات المجمدة عدم المجمدة المحران والات للفاد البكتريولوجيسي
 أو أى تغيرات كيميائية أخرى أكتشف حتى نهاية فترة التخزين السابقة .