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SOME BACTERIAL AND CHEMICAL INVESTIGATIONS ON CHICKEN LUNCHEON AND BEEF LUNCHEON

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SUMMARY

Sixty random samples of chicken luncheon and beef luncheon (30 samples of each) were collected from markets in different governorates(Cairo,Giza,Zagazig,Alexandria and Beni suef). All collected samples were subjected to bacteriological and chemical examinations. Bacteriological examination revealed that the mean counts of Bacillus cereus were $0.47 \times 10^2 \pm 0.16 \times 10^2$ and $0.67 \times 10^2 \pm 0.22 \times 10^2$ CFU/ gm ,while the mean values of anaerobic bacterial count were $0.4 \times 10^2 \pm 0.17 \times 10^2$ and $0.37 \times 10^2 \pm 0.14 \times 10^2$ CFU/ gm for chicken luncheon and beef luncheon, respectively.

Chemical examination revealed that the mean values in chicken luncheon and beef luncheon were 50.6% & 51.47% ,9.6 & 9.05% ,18.68 18.74% ,0.73 & 0.08 for water contents, protein contents, fat contents and thiobarbituric acid(malonaldehyde/Kg) respectively,where the maximum values of nitrite contents in the two products were 130 & 128 ppm,respectively.

INTRODUCTION

Traditional Egyptian luncheon is nowadays comprise an important product in Egypt. This product is known also to be handled, distributed and stored at the ordinary room temperature.

Contamination of food by Bacillus cereus constitutes not only an important cause of spoilage, but also it is associated with both diarrhoeal and emetic syndromes (Minnaard et al., 2001). Consuming of food containing spores of anaerobic bacteria were grown in the intestine and were released toxin and cause illness in human and mortality rate was high (Acha and Szyfres, 1991; Gracey et al., 1999 and FDA, 2001).

During cold storage, the moisture and protein contents decreased, while the fat content increased as well as the thiobarbituric acid value (Abd El- Salam, 1978).

Malonaldehyde is a relatively minor lipid oxidation product originating from polyunsaturated fatty acid and reacts with thiobarbituric acid reagent to produce a colored complex which measure the malonaldehyde concentration and correlate with sensory scores of oxidized and warmed over flavours of meat as mentioned by (Pokorny et al., 1985; Pikul et al., 1989 and Hoyland and Taylor, 1989).

The curing of meat involved the addition of nitrite, which is the most important ingredient in flavour development characteristic for cured meat (cured meat flavour), nitrite being antioxidant, this property strongly influences flavour development during cooking (Gray et al., 1981).

This work was planned to evaluate the locally produced chicken luncheon and beef luncheon microbiologically and chemically.

MATERIALS AND METHODS

Samples:

A total number of sixty random chicken luncheon and beef luncheon samples (30 samples of each) were collected from different markets (Cairo,Giza, Zagazig,Alexandria and Beni suef). Each sample was wrapped separately in sterile poly ethylene bag. The collected samples were subjected to bacteriological and chemical examinations.

I- Bacteriological examinations: (APHA 1992).

Preparation of sample homogenate:

Twenty five grams from each sample were aseptically placed in a sterile blender with 225 ml of sterile peptone water 2% then subjected to the following examinations:

1- Bacillus cereus count:

The total Bacillus count (CFU/ gm) was done by using B- cerus selective agar base with a polymyxin supplement and incubated at 25- 30∫for 48 hr.

2- Anaerobic bacterial count:

The plate media [Reinforced clostridium medium (RCM)] was streaked with 0.1 ml of the first or second dilution then incubated anaerobically at 37°C/ 48 hour in gas pack. The total anaerobic count was calculated.

II- Chemical examinations:

The methods of AOAC(1990) was recommended for determination of moisture contents,total protein,fat percent,thiobarbituric acid(TBA) which

evaluated as malonaldehyde/Kg of sample and nitrite contents. The colouring matter was extracted and separated according to EOSQC(1996).

RESULTS AND DISCUSSION

Table (1), revealed that the mean values of Bacillus cerus counts of examined chicken luncheon and beef luncheon samples were 0.47 X 10^2 ± 0.16 X 10^2 and 0.67 X 10^2 ± 0.22 X 10^2 CFU/ gm, respectively with a minimum of lower than 10^2 CFU/ gm. The mean values for the anaerobic bacterial count were 0.4 X 10^2 ± 0.17 X 10^2 and 0.37 X 10^2 ± 0.14 X 10^2 CFU/ gm with a maximum of 3 X 10^2 and 3 X 10^2 CFU/ gm for chicken luncheon and beef luncheon samples, respectively, which exceeded the maximum residue limits as recommended by (EOSQC 2003 for turkey luncheon and 1991 for beef luncheon) which was free: (i.e. free plates = < 10^2 CFU/ gm of sample). This could be attributed to the microbiological bad qualities of the raw materials including meat and additives as well as the cooking technology available.(Minnaard et al., 2001).

Concerning the acceptance and rejection of samples according to the EOSQC (1991) (Table 2), It was found that the percentage of rejected samples in B. cereus count and anaerobic bacterial count were 23.33 & 16.67 for chicken luncheon and 26.67 & 20 for beef luncheon samples. This could be attributed to the microbiological status of additives used by different classes of factories, spices, common salt, starches are common sources of microbial contamination (Bell and Shelef, 1978; Bauer et al., 1981 and Bernard et al., 1982).

Table (3) summarized the mean values of moisture, proteins, fat, thiobarbituric acid, nitrite and colouring matter of the examined chicken luncheon and beef luncheon samples. The average moisture content were 50.46 and 51.47% with a minimum value of 48.2 and 46.9% and a maximum value of 54.3 and 53.9% for the examined chicken luncheon and beef luncheon samples, which were within the permissible limit (60% and 55%) recommended by EOSQC (2003 and 1991) for turkey and beef luncheon, respectively. Nearly similar results were obtained by Hemeida et al. (1986).

Regarding the protein % the mean values were 9.6 and 9.05 with a maximum of 10.8 and 9.7 and a minimum of 8.8 and 8.5 for chicken and beef luncheon samples, respectively. However, these relatively lower values may be due to cold storage as described by Abd El- Salam (1978). These values were lower than the permissible limit (not less than 12 and 15%) as recommended by EOSQC (2003 and 1991) for turkey luncheon and beef luncheon respectively. The mean values of fat were 18.68 and 18.74% with a maximum 22.8

and 23.6 for chicken and beef luncheon samples at which the maximum values exceeded the permissible limit (not more than 15%) recommended by EOSQC (2003) for turkey luncheon and (1991) for beef luncheon samples Doll (1975), Lui et al. (1979), Pearson et al. (1983) and Jossens and Gebores (1985) reported the evidence of linking fat with heart diseases of many different kinds and with cancer in relation to total fat intake.

The mean values of thiobarbituric acid were 0.73 and 0.08 malonaldehyde / kg for chicken luncheon and beef luncheon which were within the permissible limit (0.9 mg/ kg as malonaldehyde) recommended by EOSQC (1995) for chicken sausage and chilled turkey. The maximum values of nitrite in both chicken luncheon and beef luncheon were 130 and 128 ppm which exceeded the permissible limit (100 ppm) for turkey luncheon and (125 ppm) for beef luncheon recommended by EOSQC (2003 and 1991), respectively, David (1995) reported that sodium nitrite provoked urticaria or headache. Ender et al. (1964), Hotchkiss (1987) and Ross et al. (1987) reviewed the occurrence of nitrose compound in cured meats and stipulated the suspicion of nitrosamine as a carcinogen. Furthermore, Long et al. (1982) reported that no nitrite or other curing agents are to be allowed for baby through todler foods in the USA.

No colouring matter were detected in all the examined market luncheon samples (chicken and beef) neither recommended by EOSQC (1991) nor non recommended one. The results obtained in table (4), revealed that the percent of accepted market examined chicken luncheon and beef luncheon samples for moisture, colouring matter were 100. However, all the examined samples were rejected due to low protein percent than the permissible limit recommended by EOSQC (1991). The percent rejected samples for fat were 13.33 and 16.67 while nitrite were 13.33 and 13.33 for chicken and beef luncheon samples, respectively.

Table (1): Bacillus cereus and anaerobic counts in the products.

Count		Chicken luncheon	Beef luncheon
Bacillus cereus count	Minimum	$< 10^2$	$< 10^2$
	Maximum	3×10^2	4×10^2
	Mean ± SE	$0.47 \times 10^2 \pm 0.16 \times 10^2$	$0.67 \times 10^2 \pm 0.22 \times 10^2$
Anaerobic bacterial count	Minimum	$< 10^2$	$< 10^2$
	Maximum	3×10^2	3×10^2
	Mean ± SE	$0.4 \times 10^2 \pm 0.17 \times 10^2$	$0.37 \times 10^2 \pm 0.14 \times 10^2$

Table (2): Acceptance and rejection of samples according to **EOSQC(1991)**

Examination Sample	Bacillus cereus count		Anaerobic bacterial count	
	A	R	A	R
Chicken luncheon	23 76.67%	7 23.33%	25 83.33%	5 16.67%
Beef luncheon	22 73.33%	8 26.6%	24 80%	6 20%

A= Accepted : $<10^2$ (-ve plates)
R= Rejected : $>10^2$

Table (3): Chemical analysis of examined market chicken luncheon and beef luncheon samples (n= 30 for each).

Test		Chicken luncheon	Beef luncheon
Moisture %	Minimum	48.2	46.9
	Maximum	54.3	53.9
	Mean ± SE	50.76 ± 1.13	51.47 ± 0.94
Protein %	Minimum	8.8	8.5
	Maximum	10.8	9.7
	Mean ± SE	9.6 ± 0.36	9.05 ± 0.21
Fat %	Minimum	16.3	16.6
	Maximum	22.8	23.6
	Mean ± SE	18.68 ± 0.29	18.74 ± 0.34
Thiobarituric acid (Malonaldehyde/kg)	Minimum	0.62	0.02
	Maximum	0.86	0.17
	Mean ± SE	0.73 ± 0.02	0.08 ± 0.0006
Nitrite (ppm)	Minimum	98	110
	Maximum	130	128
	Mean ± SE	110.33 ± 1.47	120.1 ± 1.2

N.B. Colouring matters failed to be detected.

Table (4): Percentage of accepted and rejected chicken and beef luncheon samples due to chemical examinations (n = 30).
(acc. To EOSQC, 1991, 1995 & 2003).

Examination / Sample		Moisture %		Protein %		Fat %		Thiobaritoric acid		Nitrite		Coloring matter	
		A	R	A	R	A	R	A	R	A	R	A	R
		≤ 55	>55	≥15	<15	≤ 20	>20	≤0.9	>0.9	≤ 125	>125	-ve	+ve
Chicken luncheon	No.	30	0	0	30	26	4	30	0	26	4	30	0
	%	100	0	0	100	86.67	13.33	100	0	86.67	13.33	100	0
Beef luncheon	No.	30	0	0	30	25	5	30	0	26	4	30	0
	%	100	0	0	100	83.33	16.67	100	0	86.67	13.33	100	0

A = Accepted R= Rejected
* Concerning colouring matters all samples werre accepted due to the freedom from them.

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