



Quality assurance of some locally processed meat products

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ABSTRACT

One hundred random samples of meat products represented by 25 samples each of minced meat, beef burger, sausage and luncheon which were collected from different supermarkets in Cairo and Giza cities, Egypt. Each sample was packed in plastic bag and transferred immediately to the laboratory in an icebox with a minimum period of delay to be examined organoleptically, bacteriologically and chemically.

Organoleptic evaluation, regarding color, odor and taste, the percentages of undesirable samples were 28%, 28% and 24%, 20%, 20% and 16%, 24%, 20% and 24% and 16%, 16% and 24% of minced meat, beef burger, luncheon and sausage, respectively.

Bacteriological evaluation, regarding minced beef, the mean values of APC, Enterobacteriaceae and Staphylococcus aureus count was 3.3×10^5 , 4.27×10^3 and 0.2×10^2 , respectively and the number of positive samples to *E.coli* and salmonella was 4 and 3. Regarding beef burger, the mean values of APC, Enterobacteriaceae and Staphylococcus aureus count was 1.6×10^4 , 7.12×10^2 and 0.1×10^2 , respectively and the number of positive samples to *E.coli* and salmonella was 3 and one.

Regarding luncheon, the mean values of APC, Enterobacteriaceae and Staphylococcus aureus count was 2.3×10^3 , 5×10^2 and $<10^2$, respectively and the number of positive samples to *E.coli* and salmonella was 3 and 2. Regarding sausage, the mean values of APC, Enterobacteriaceae and Staphylococcus aureus count was 4.5×10^5 , 7×10^3 and 0.3×10^2 , respectively and the number of positive samples to *E.coli* and salmonella was 5 and 6.

Chemical examination, regarding minced beef, the results revealed that the mean values of pH, TVN and TBA were 5.89, 24.69 and 0.70, respectively and the percentages of accepted samples regarding TVN and TBA were 60% and 76%, respectively. Regarding beef burger, the mean values of pH, TVN and TBA were 5.8, 17.01 and 0.44, respectively.

Regarding sausage, The mean values of pH, TVN and TBA were 5.9, 16.23 and 0.45, respectively and the percentages of accepted samples of sausage regarding TVN and TBA were 92% and 100%, respectively. Regarding luncheon, the mean values of pH, TVN and TBA were 5.9, 22.01 and 0.25 respectively.

Key words:

Quality, processed meat, microbiological, organoleptic, TVN, TBA
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1. INTRODUCTION

According to the consumers' demand for fresh, durable and safe foods, it is obligatory for the food industries to present their products at the best. (Jaeger et al., 2014) because the link between nutrition and health become more and more a hot topic (Aggett et al., 2005).

Food borne illness causes an estimated 76 cases annually resulting in billions dollars in economic and productivity losses. Food borne pathogens result in over 5000 deaths / year, one-third of which can be attributed to meat and poultry (CDC 2005).

2. MATERIAL AND METHODS

2.1 Collection of samples

2.2 Organoleptic examination

The samples were evaluated physically for colour, odour, taste and texture according to Gracey (1986); Miller (1994) and Marriot (1995)

2.2.1 Flavour (Grossklau et al. 1979):-

2.3 Chemical examination for détérioration criteria

2.3.1 Determination of Thiobarbituric acid number (TBA): (Tarladgis et al., 1960) with additional modification of (Pikul et al., 1983).

2.3.2 Determination of total volatile nitrogen (FAO, 1980)

2.3.3 Determination of pH value (Chamber et al., 1976)

2.4 Bacteriological examination

2.4.1 Determination of Aerobic plate count at 30 ° C (Swanson et al. 1992)

2.4.2 Total enterobacteriaceae count (ICMSF, 1978)

2.4.3 Enumeration of *Staphylococcus aureus* count (FAO, 1992)

2.4.4 Isolation and identification of some food borne pathogens

2.4.4.1 Isolation and identification of *E.coli* (ICMSF, 1978)

2.4.4.1.1 Identification of *E. coli* (Kreig and Holt, 1986):-

1. Morphological characters:

2. Biochemical reactions:

2.1 Vogusproskauer test (V.P.) (Collins and Lyne, 1984)

3. Serological identification of the isolated *E. coli* (Sojka, 1965)

2.4.4.2 Isolation and identification of *Salmonellae*

2.4.4.2.1 Isolation of *salmonellae* (Vassiliadis et al. 1983)

2.4.4.2.2 Identification of the isolated *salmonellae*

1- Morphological examination

2-Biochemical reactions

3-Serological identification of *Salmonella* (Kauffman, 1974)

3. RESULTS

Table1: Organoleptic properties of the examined meat product samples (n=25)

Sensory parameters	Colour				Odour				Taste			
	Desirable		Undesirable		Desirable		Undesirable		Desirable		Undesirable	
Samples	No	%	No	%	No	%	No	%	No	%	No	%
Minced meat	18	72	7	28	18	72	7	28	19	76	6	24
Beef burger	20	80	5	20	20	80	5	20	21	84	4	16
Luncheon	19	76	6	24	20	80	5	20	19	76	6	24
Sausage	21	84	4	16	21	84	4	16	21	84	4	16

Table2: The mean values of APC (CFU/g), *Staphylococcus aureus* count (CFU/g) and total Enterobacteriaceae count (CFU/g) in examined samples (n=25):-

Samples	APC	total	
		<i>Staphylococcus aureus</i> count	Enterobacteriaceae count
Minced meat	3.3x10 ⁵	0.2x10 ²	4.27 x 10 ³
Beef burgef	1.6x10 ⁴	0.1x10 ²	7.12 x 10 ²
Sausage	4.5x10 ⁵	0.3x10 ²	7 x 10 ³
Luncheon	2.3x10 ³	<10 ²	5 x 10 ²

Table3:- Incidence of Enteropathogenic E.coli and salmonella in the examined samples (n=25):-

Samples	Positive sample to enteropathogenic E.coli		Positive sample to Salmonella	
	No	%	No	%
	Minced meat	4	16	3
Beef burger	3	12	1	4
Sausage	5	20	6	24
Luncheon	3	12	2	8
Total	15	60	12	48

Table4:-Mean values of deterioration criteria [pH, total volatile nitrogen (TVN) and thiobarbituric acid (TBA)] of the examined meat product samples (n=25)

Samples	pH	TVN	TBA
Minced meat	5.89	24.69	0.70
Beef Burger	5.8	17.01	0.44
Sausage	5.9	16.23	0.45
Luncheon	5.9	22.01	0.25

4. DISCUSSION

1) Organoleptic evaluation:-

Table 1 revealed that:-

A) Minced beef

Regarding color, odor and taste, the percentages of undesirable samples were 28, 28 and 24 % respectively

B) Beef burger

Regarding color, odor and taste, the percentages of undesirable samples were 20, 20 and 16 % respectively

C) Luncheon

Regarding color, odor and taste, the percentages of undesirable samples were 24, 20 and 24 % respectively. Samir-Shimaa (2016) obtained nearly similar results regarding the colour and odour.

D) Sausage

Regarding color, odor and taste, the percentages of undesirable samples were 16, 16 and 24 % respectively. The obtained results were higher than those reported by Mohamed-Manal (2002)

2) Bacteriological evaluation:

Contamination of meat products by bacteria can be due to the poor sanitation applied in the factories, the poor technology adopted, more manual handling of the product and manual filling and absence of the tunnel freezing of the product which may reduce the propagation of bacteria during the phase of preparation. (Ayres 1960 and Niven, 1989).

A) Minced beef

Results achieved in table 2 revealed that the mean values of APC (CFU/g), Staphylococcus aureus count (CFU/g) and Enterobacteriaceae (CFU/g) of the examined samples were 3.3×10^5 , 0.2×10^2 and 4.27×10^3 , respectively. Nearly similar results were obtained by Hassan Hala (2001) 2.8×10 regarding Staphylococcus aureus

Results achieved in table 3 revealed that the percentage of positive samples to enteropathogenic E.coli was 16% and the obtained results were similar with those reported by Saleh (2001). Also, the percentage of positive samples to Salmonella was 12% and the obtained results were higher than those reported by Bosilevac et al., (2009) 4.2%

B) Beef burger

Results achieved in table 2 revealed that the mean values of APC (CFU/g), Staphylococcus aureus count (CFU/g) and Enterobacteriaceae (CFU/g) of the examined samples were 1.6×10^4 , $< 10^2$ and 7.12×10^2 , respectively. Lower results (8.20×10^2) regarding APC were reported by El-Shamy-Samar (2015), Higher results regarding Staphylococcus aureus count were recorded by *El-Mossalami (2003)* 9×10^2 and Nearly similar results (5.27×10^2) were reported by El-Shamy-Samar (2015) regarding enterobacteriaceae count.

Results achieved in table 3 revealed that the percentage of positive samples to

enteropathogenic E.coli was 12% and the obtained results were lower than those reported by Mosbah (2017). Also, the percentage of positive samples to Salmonella was 4% and the obtained results were nearly similar to those reported by Mosbah (2017) 8%

C) Luncheon

Results achieved in table 2 revealed that the mean values of APC (CFU/g), Staphylococcus aureus count (CFU/g) and enterobacteriaceae (CFU/g) of the examined samples were 2.3×10^3 , 0.1×10^2 and 5×10^2 respectively. Higher results were reported by Ashraf-Abeer (2016) 8.9×10^3 regarding APC, Higher results were reported by Ashraf-Abeer (2016) 1.1×10^3 regarding Staphylococcus aureus count and nearly similar results were reported by El-Shamy-Samar (2015) 4.65×10^2 regarding enterobacteriaceae count.

Results achieved in table 3 revealed that the percentage of positive samples to enteropathogenic E.coli was 12% and the obtained results were lower than those reported by Mosbah (2017) 24%. Also, the percentage of positive samples to Salmonella was 8% and the obtained results were nearly similar to those reported by El-Shabrawy-Hanaa (2015) 4%

D) Sausage

Results achieved in table 2 revealed that the mean values of APC (CFU/g), Staphylococcus aureus count (CFU/g) and enterobacteriaceae (CFU/g) of the examined samples were 4.5×10^5 , 0.3×10^2 and 7×10^3 respectively. Nearly similar results were obtained by Abd El-Latef (2014) 3.2×10^5 , regarding APC, Higher results were recorded by Abd El-Latef (2014) 2.8×10^4 regarding Staphylococcus aureus count and Lower results were obtained by El-Shamy-

Samar (2015) 7.47×10^2 regarding enterobacteriaceae count.

Results achieved in table 3 revealed that the percentage of positive samples to enteropathogenic E.coli was 20% and the obtained results were lower than those reported by Mosbah (2017) 60%. Also, the percentage of positive samples to Salmonella was 24% and the obtained results were agreed with El-Shabrawy-Hanaa (2015)

3) Chemical examination for deterioration criteria

A) Minced beef

*It is evident from table 4 that the mean values of pH, TVN and TBA are 5.89, 24.69 and 0.70 respectively. El-Shabrawy-Hanaa (2015) reported nearly similar results regarding pH (5.63) and lower results regarding TVN (5.23) and TBA (0.10) and Kortoma (2016) reported nearly similar results regarding TBA (0.67) and higher results regarding TVN (12.60)

B) Beef burger

*It is evident from table 4 that the mean values of pH, TVN and TBA are 5.8, 17.01 and 0.44 respectively. Nearly similar results were reported by Mohamed-Manal (2002) regarding pH (5.7), TVN (15.9) and TBA (0.64)

C) Sausage

*It is evident from table 4 that the mean values of pH, TVN and TBA are 5.9, 16.23 and 0.45 respectively. El-Shabrawy-Hanaa (2015) reported nearly similar results regarding pH (5.62) and lower results regarding TVN (6.20) and TBA (0.12) and Kortoma (2016) reported nearly the same results regarding TBA (0.68) and TVN (15.90)

D) Luncheon

*It is evident from table 4 that the mean values of pH, TVN and TBA are 5.9, 22.01 and 0.25 respectively. Samir-Shimaa (2016)

reported nearly similar results in regards to pH (13.37) and TBA (0.18), while, the author reported higher results in regards to TVN (13.37).

The increase in the values of TVN might be attributed to post processing circumstances particularly at the shop level. (Failure in freezing storage during distribution and marketing) (Cross et al., 1986).

The increase in the values of TBA could be due to the use of old meat or the bad handling of the meat during processing which enable the fat to get oxidized or due to the poor technology available in the factories.

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