Bacteriological evaluation of some chicken meat products.

Reham, A. Amin[1]; Nesrin, Z. Eliwa [2]; **Naglaa, A. Eltaib [1]

[1]*Food Control Department, Fac. Vet. Med., Benha University, Egypt.* [2]*Animal Health Institute, Tanta lab. Egypt.*

A B S T R A C T

A grand total of ninety random samples of chicken meat products represented by fresh pane, popcorn and luncheon (30 of each)were collected from different supermarkets and retailers of different sanitation levels in different cities at Gharbia Governorate, Egypt for bacteriological examination The mean values of APC ,Coliform and total Staphylococcal counts (log cfu/g) were7.46 ± 0.51^b, 5.25 ± 0.10^a and 5.10 ± 1.28^a in the examined chicken fresh pane samples, 5.41 ± 0.35^c, 4.13 ± 1.40^b and 4.73 ± 1.78^b in the examined chicken luncheon samples and 7.10 ± 1.37^a, 5.28 ± 2.25^a and 5.88 ± 1.66^a in the examined chicken pop corn samples, respectively . On the other hand, the percentages of unaccepted samples of fresh pane, luncheon and popcorn were 100%, 83.3% and 86.7% according to the permissible limits stipulated by EOS 1651 (2005) for coliform (not exceed 10^2) respectively, with high significant difference between the examined samples ($P<$ 0.05). Moreover, the incidence of coagulase positive *S. aureus* isolated from chicken products samples fresh pane, luncheon and pop-corn were 10%, 23.3% and 23.3% respectively. The public health importance of the isolated microorganism and the recommended points to prevent or even minimize contamination of chicken meat products with microorganisms were discussed.

Keywords: chicken meat products, APC, *S. aureus*, coliform.

1. INTRODUCTION

Poultry meat products are highly desirable, palatable, digestible and nutritious for all ages. In addition, they are low in price in comparison to beef and mutton. Quality of products is that meet some need or expectation of consumers and safe and wholesome as well as an advantages of further processing of poultry meat are improving juiciness and flavor, shelf life and water holding capacity (Sahoo et al., 1996)**.** Chicken carcasses have higher pathogenic and spoilage bacterial counts than most other foods, where carcass can be contaminated at several points throughout the processing operation during scalding, de-feathering and evisceration as well as cross contamination from other birds and processing equipment (Gonzalez-Fandos and Dominguez, 2006). Developing countries face high incidences of food poisoning outbreaks, with obvious economic consequences. While food borne diseases remain an important public health problem worldwide, one of the most significant food safety hazards associated with foods of animals origin (Kivi et al., 2007). *S. aureus* produces staphylococcal enterotoxin and responsible for almost all staphylococcal food poisoning. Staphylococcal food poisoning

symptoms generally have a rapid onset, appearing around 3 hours after ingestion (range 1–6 hours). Common symptoms include nausea, vomiting, abdominal cramps and diarrhoea. Individuals may not demonstrate all the symptoms associated with the illness. In severe cases, headache, muscle cramping and transient changes in blood pressure and pulse rate may occur. Recovery is usually between 1–3 days (Food and Drug Administration "FDA", 2012). Coliform bacteria are associated with the intestinal tracts of humans and animals. Their presence out-side the intestines may be an indication of contamination with the fecal discharges of humans or animals. Numerous food-borne pathogens can be transmitted through feces of human and animals; the presence of coliforms may indicate the possibility that foodborne pathogens may also be contained in the food as well (Worobo, 1 999). Contamination of poultry meat with food borne pathogens remains an important public health issue, where many food poisoning bacteria contaminate chicken meat (Mbata, 2005). Therefore, the present study aimed to evaluate the bacteriological quality of some chicken meat products represented by fresh pane,

luncheon and popcorn through: Determination of APC, *Coliform* count, *Staphylococci* count, and isolation and identification of*, S. aureus.*

2. MATERIAL AND METHODS

2.1. Collection of Samples:

Ninety random samples of chicken meat products represented by fresh pane, popcorn and luncheon (30 of each) were collected from different supermarkets and retailers of different sanitation levels in different cities at Gharbia Governorate, Egypt. Each sample was separately packed, identified and transferred immediately in cooling icebox to the laboratory without undue delay where they were subjected to the following bacteriological examination.

2.2. Preparation of the samples (American Public Health Association (APHA), 1992):

Ten grams of the examined samples were weighted into sterile stomacher bags diluted with 90 ml sterile buffered peptone water (BPW 0.1%) and homogenized in a stomacher (Seward 400) for 2 min. to give a dilution of 1/10. One ml of homogenate was mixed with 9ml of BPW (0.1%) and then decimal serial dilutions were prepared.

2.3. Determination of APC (APHA, 1992).

It was done using standard plate count agar medium.

2.4. Determination to the acceptability of coliform (EOS (Egyptian Organization for Standardization and Quality " EOS", (1651 / 2005a)).

It was done using violet red bile agar medium.

2.5. Determination of Staphylococci count (Food and Agricultural Organisation"FAO", 2010).

It was done using Baird Parker agar medium.

2.6. Isolation and Identification of S. aureus (International Commission on Microbiological Specification for Food "ICMSF", 1996).

It was done using Baired parker agar medium.

3. RESULTS

Table (1) and Fig. (1) showed that APC (log cfu/g) in the examined fresh pane, luncheon and pop-corn samples varied from 6.20 to 8.00 with a mean value of 7.46 ± 0.51^b, 4.48 to 6.11 with an average value of 5.41 ± 0.35^c and 5.42 to 9.92 with a mean value of 7.10 ± 1.37^a, respectively. Also, there was high significant difference of total APC count between the examined samples (fresh pane, luncheon and popcorn) ($P < 0.05$).

The result achieved in table (2) illustrated that 100% ,86.7% and 83.35 of the examined chicken samples of fresh pane, luncheon and popcorn, respectively exceeded the permissible limit recommended by EOS. 1651 (2005a) which stated that the permissible limit of *coliforms* was 10^2, while 0%, 16.7% and 13.3% of chicken fresh pane, luncheon and popcorn, were accepted according to EOS 1651 (2005a), respectively.

Table (3) revealed that the *staphylococci* count (log cfu/g) for the of examined fresh pane, luncheon and popcorn samples varied from 3.47 to 7.80 with a mean value of 5.10 ± 1.28^a, <10 to 7.10 with a mean value of 4.73 ± 1.78^b and <10 to 9.24 with a mean value of 5.88 ± 1.66^a, respectively. In other words, there is significant difference of total staphylococci count between the examined samples (fresh pane, luncheon and popcorn) ($P < 0.05$). Also, the same table illustrated that 100% and 93.3 and 97.6% of chicken samples of Fresh pane, luncheon and popcorn were exceeded the permissible limit (10^2) according to safe permissible limits stipulated by EOS 1651 (2005). So it is clear that, the result is not compatible to EOS (not exceed 10^2).

Table (4) declared that the incidence rate of coagulase positive staph. aureus in the examined chicken samples of fresh pane, luncheon and popcorn were 10%, 23.3% and 23.3% from the total number of examined samples (n=30), respectively.

Table (1): Statistical analytical results of APC (log cfu/g) of the examined samples of chicken meat products (n=30)

Chicken meat Products	Min.	Max.	Mean ± S.E
Fresh Panee	6.20	8.00	7.46 ± 0.51^b
Luncheon	4.48	6.11	5.41 ± 0.35^c
Popcorn	5.52	9.92	7.10 ± 1.37^a

*Means within a column followed by different letters showed high significant difference ($P < 0.05$).
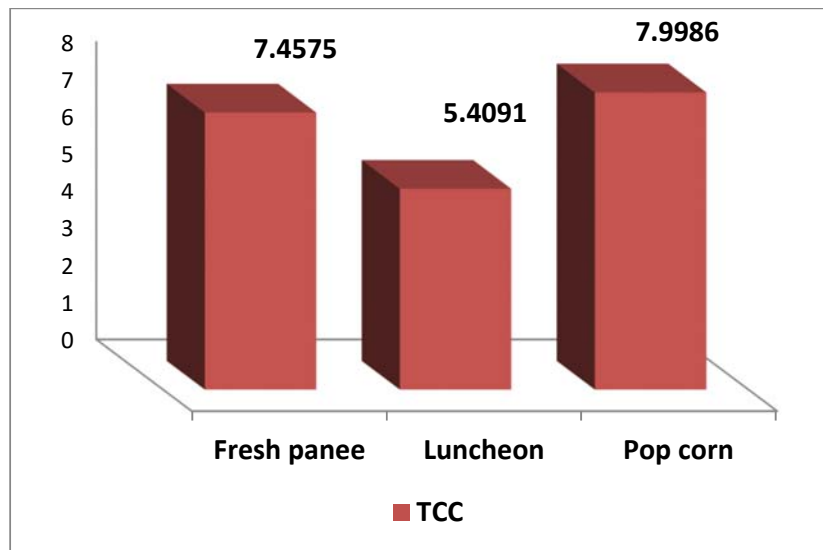
Fig. (1): Mean values of APC (log cfu/g) of the examined samples of chicken meat products

Table (2): Acceptability of total coliform count (log cfu/g) of the examined samples of chicken meat products (n=30)

Chicken meat Products	Accepted samples[*]		Unaccepted samples[*]	
	No.	%	No.	%
Fresh Panee	-	0	30	100
Luncheon	5	16.7	25	83.8
Popcorn	41	13.3	26	86.7

[*]= Permissible Limit should not exceed (10^2) log cfu/g according to EOS 1651 (2005)

Table (3): Statistical analytical results of total *Staphylococci* count (log cfu/g) of the examined samples of chicken meat products (n=30)

Chicken meat Products	Min.	Max.	Mean ± S.E	positive samples[*]		Negative samples[*]	
				No.	%	No.	%
Fresh Panee	3.48	7.80	5.10 ± 1.28^a	30	100	-	0
Luncheon	<10	7.10	4.73 ± 1.78^b	28	93.3	2	6.7
Popcorn	<10	9.24	5.88 ± 1.66^a	29	96.7	1	3.3

[*]= Permissible Limit should not exceed (10^2) log cfu/g according to EOS (2005b). Means within a column followed by different letters showed significant difference ($P < 0.05$).

Table (4) : Incidence of coagulase positive *S. aureus* isolated from examined chicken meat products samples (n=30)

Chicken meat Products	Coagulase positive		Coagulase negative	
	No.	%	No.	%
Fresh Panee	3	10	27	90
Luncheon	7	23.3	23	76.6
Popcorn	7	23.3	23	76.6

N. B : % was calculated according to the total number of samples.

4. DISCUSSION

Aerobic plate counts are acceptable measure of the general degree of bacterial contamination and the hygienic conditions of processing plants (Cohen et al., 2007). The results of the present study were nearly similar as reported by Barbuddhe et al. (2003) (7.34 log cfu/g) and Bhandari et al. (2013) (7.24 log cfu/g). On the other hand, higher counts were reported by Huong et al. (2009) (11.1logcfu/g) and El-Tahan et al. (2006) (8 X107cfu/g). Lower counts were reported by Javadi and Safarmashaei (2011) (5.5 log cfu/g), The higher APC in the examined chicken meat products was due to slaughtering and sale of chicken meat in the same place, which provokes cross contamination of the carcasses. As well as, indicates improper hygiene during processing and incorrect storage conditions, which can lead to proliferation of pathogens. Although pop corn is exposed to somewhat heat treatment before being ready to selling as semi-cooked food, its high microbial count is being attributed to unsatisfactory processing, unsuitable storage temperature and the way of its marketing. Addition of certain spices during manufacture of the products may lead to increase in bacterial population (Sharaf, 1999).

The detection of *coliforms* is widely used as a mean of measuring the effectiveness of decontamination (Lues and Van-Tonder, 2007). Our results were relatively lower in *coliform* counts than that recorded by Sengupta et al. (2012) (32.2 log cfu/g) and Hegazi (1995) (7.36 log cfu/g) while, were higher in counts than that obtained by Chaiba A. et al. (2007) (3.99 log cfu/g) , Huong et al. (2009) (2.84 log cfu/g) and nearly resembles the mean count reported by Santosh Kumar et al. (2012) (4.97 log cfu/g) and Vural et al. (2006) (4.92 log cfu/g). High *coliform* counts indicated poor hygienic quality of meat. The contamination with *coliform* may occur during slaughtering, cutting or dressing of carcasses. Soiled hands, shopping blocks or knives used for handling and cutting or contaminated water were considered as sources of *coliforms* in meat (Yadav et al., 2006). So, presence of *coliforms* in greater number may be responsible for inferior quality of chicken meat resulting in economic losses and possibility of presence of other enteric pathogens, which constitute at time public health hazard (Chaem et al., 2002).

Staphylococci count in this work were nearly resembles in the mean count reported by Selvan et al. (2007) (4.88 log cfu/g), (Joshi and Joshi, 2010) (4.46 log cfu/g), On the other hand higher counts were reported by Bhandari et al. (2013) (6.5 log cfu/g and lower count by Sengupta et al. (2012) (3.7 log10 cfu/g). The presence of *staphylococci* could be due to the insanitary condition of the butcher and absence of the health services in butcheries.

The presence of *staphylococci* in pop corn and luncheon in high percent may be attributed to inadequate heat treatment, unhygienic handling by the workers, using dirty equipment for slicing, poor hygienic quality of raw meat, inadequate storage and thawing conditions, contamination from grinder and extra- over time between mincing and mixing (Eisel et al., 1997). Lower result for coagulase positive *S. aureu*s was recorded by Mousa et al. (1993) (18%) in luncheon.

The highest contaminated chicken meat samples with coagulase positive *S. aureu*s may be due to human contact with cooked food, as in handling and in slicing, invariably adds *S.aureus* at levels of 10 to 10^2 to many of sample units (Surkiewicz et al., 1973). Such levels are harmless but offer sufficient inoculum for growth to hazardous levels if subsequent conditions of time-temperature abuse occur (Johnston and Tompkin, 1992). Therefore, to produce chicken meat products with high quality to safe guard consumer's health "fit for human consumption ", the following suggestion and recommendations should be taken into consideration to prevent or even minimize contamination of chicken meat products with microorganisms. Periodical examination of workers and hand washing facilities should be present. Periodical sanitation of utensils, chilling rooms and freezing cold stores. Proper hygienic measures should be considered during handling, packing, transportation and storage of poultry carcasses. chicken carcasses should be refrigerated immediately after slaughtering to prevent or retard the growth of microorganisms. Also, high quality spices and food additives (free from any contaminants) should be used. All poultry establishments should develop and implement a system of preventive control designed to improve the safety of their products, known as HACCP (Hazard Analysis and Critical Control Points).

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