Bacteriological quality of retailed chicken meat in Zagazig City

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Abstract

Poultry meat is very popular food in Egypt as well as throughout the world. No wonder since it is delicious, nutritious and considered as a good and cheap source of protein characterized by good flavor and easily digested. Therefore, the present study was conducted to demonstrate the bacteriological evaluation of some chicken samples (thigh, breast, gizzard, liver, neck skin and cloacae skin) in Zagazige City, Sharkia Governorate, through determination of enterobacteriacae count and most propable number of coliforms. Results revealed that the mean count of enterobacteriacae 5.54±0.087, 5.45±0.097, 5.54±0.088, 5.40±0.076, 5.39±0.073 and 5.32±0.064 log10 CFU/g and MPN of coliforms was 5.50 ±0.17, 5.66 ±0.23, 5.43 ±0.22, 5.21 ±0.19 , 5.58±0.18 and 5.34 ±0.26 log10 CFU/g in the examined thigh, breast, gizzard, liver , neck skin and cloacae skin respectively.

1. Introduction

Chicken meat production and consumption rapidly increased worldwide due to its competitive price, absence of religious obstacles and high content of essential amino acid required for growth. Chicken meat is considered a good source of animal protein with a high biological value which is required for nutrition of human in all ages and a good source of vitamins especially B complex and certain minerals as iron. It is rich in poly- unsaturated fatty acids with a low cholesterol value; chicken meat is easily digested and is recommended for the nutrition of patients. Chicken meat is an ideal media for microbial growth due to long chain of processing, packaging and transportation **(Capita *et al.*, 2001).** *Enterobacteriaceae* had an epidemiological importance as some of its members were pathogenic and may cause serious infection and food poisoning to human. Moreover, the TEC can be taken as an indicator of enteric contamination **(Algabry et al. (2012); El-Gendy *et al.* (2014) and Pogorelova *et al.*, 1993)**. The presence of coliformss in chicken meat and giblets may be responsible for their inferior quality resulting in great economic losses beside their presence in great number may raise the public health hazard **(ICMSF, 1978).**

2. Materials and Methods:

2.1 Collection of samples:

One hundred and twenty chicken samples (thigh, breast, gizzard, liver, neck skin and cloacae skin) (20, each) were randomly collected from different outlets with different sanitation

levels at Zagazig city, Sharkia Governorate, Egypt. All samples were transferred under complete a septic conditions to Food Control lab for bacteriological examination.

2.2 Preparation of samples:

25 grams from each chicken sample were aseptically transferred into a sterile blender containing 225 ml of 0.1% sterile buffered peptone water (**BPW, HIMEDIA, M614-500G**). The contents were homogenized for 2.5 min at room temperature (25ºC) and then allowed to stand for 5 min to provide a homogenate which represents the dilution of 10^{-1}. One ml of the homogenate was transferred into a sterile test tube containing 9 ml of 0.1% BPW, then ten folds serial dilutions were prepared up to the required dilution 10^{-6} **(ICMSF, 1978)**.

2.3 Determination of microbial quality:

2.3.1 Determination of *Enterobacteriacae* count:

The total *Enterobacteriaceae* count was carried out according to **(ICMSF, 1978)**. From the ready prepared serial dilution (10^{-4}) ; 0.1 ml was transferred and evenly distributed over a dry surface of sterile violet red bile (VRBG) agar(**HIMEDIA, M581BP**) by a bented glass rod. The plates were incubated in an inverted position at 37ºC for 24 hs. The suspected colonies (purple to red colonies surrounded by purple hallo) were counted and calculated per gram of sample.

2.3.2 Determination of total Coliformss count (MPN):

One ml from the ready prepared serial dilution 10^{-4}, 10^{-5}, 10^{-6} was inoculated separately into three sterile MacConkey broth tubes (**Oxide CM5**) with inverted Durham's tubes **(ICMSF, 1978)**. The inoculated tubes were incubated at 37ºC then examined after 24 and 48 hs. Positive tubes with acid and gas production in the inverted Durham's tubes were recorded. The most probable number of coliformss /ml was calculated.

3. Results and Discussion:

From the results recorded in table (1), the mean values of enterobacteriaceae count were 5.5435±0.08731, 5.4523±0.09699, 5.5404±0.08780, 5.3954±0.07610, 5.3919±0.07342 and 5.3201±0.06435 in chicken thigh, breast, gizzard, liver, neck skin and cloacae skin respectively. These results were more than 3.04 log CFU/g reported by **Capita *et al.* (2000)** and 2.7 $\log_{10}$ CFU/g (**Cegielskaradziejewska *et al.*, 2008)**) .

Table (1): Statistical analytical results of Enterobacteriaceae count $\log_{10}$CFU/g in the examined chicken samples (N = 20, each).

Samples	Minimum	Maximum	Mean ± S.E
Thigh	5.08	5.95	5.54±0.087
Breast	4.70	5.95	5.45±0.097
Gizzard	5.00	5.95	5.54±0.088
Liver	5.00	5.95	5.40±0.076
Neck skin	5.00	5.95	5.39±0.073
Cloacae skin	5.00	5.85	5.32±0.064

Abbr. S.E: Standard error of mean; N = number; The limit of detection (LOD): 1 $\log_{10}$ CFU/g
There is no significant difference between the examined samples (P> 0.05)

Higher results were reported by **Rindhe *et.al.* (2008)** (6.27 log CFU/g) and **Bhandari *et.al.* (2013)** (8.5 log CFU/g).

Enterobacteriaceae in meat is used as an indicator of fecal contamination and poor hygiene during processing and storage. The increase in Enterobacteriaceae count in chicken meat could be occurred as a result of unsanitary environmental conditions, poor personnel hygiene practices, absence of the in-between cleaning of chickens contact surfaces and cross-contamination between chicken and the contact surface.

The result given in table (2) shown that the coliforms (MPN) ranged from 4.54 to 6.04 with a mean value of 5.50 ±0.17, 3.87 to 6.04 with a mean value of 5.66 ±0.23 , 4.54 to 6.04 with a mean value of 5.43 ±0.22 , 4.54 to 6.04 with a mean value of 5.21 ±0.19,.56 to 6.04 with a mean value of 5.58±0.18 and from4.04 to 6.04 with a mean value of log $_{10}$/g in examined thigh breast, gizzard, liver, neck skin and cloacae skin, respectively. The results were more than 2.7 log CFU/g reported by **Capita et.al. (2002)**, 2.6 log CFU/g **(Northcutt et al., 2003)**, 1.13 log CFU/g **(Selvan et al., 2007),** and 1.03 log CFU/g **(Joshi and Joshi, 2010)**, while less than 4.97 log CFU/g reported by **Santosh Kumar et al. (2012)** and 6.5 log CFU/g (**Bhandari etal. (2013)**. High coliforms counts indicated poor hygienic quality of meat; it may be occurred during slaughtering, cutting or dressing of carcasses. As well as, soiled hands, shopping blocks or knives used for handling and cutting or contaminated water **(Yadav *et al.*, 2006)**.

Table (2): Most probable number of coliformss log$_{10}$CFU/g in the examined chicken samples (N = 20, each).

Samples	Minimum	Maximum	Mean ± S.E
Thigh	4.54	6.04	5.50 ±0.17
Breast	3.87	6.04	5.66 ±0.23
Gizzard	4.54	6.04	5.43 ±0.22
Liver	4.54	6.04	5.21 ±0.19
Neck skin	4.56	6.04	5.58±0.18
Cloacae skin	4.04	6.04	5.34±0.26

*S.E: Standard error of mean; N = number; the limit of detection (LOD): 1 log$_{10}$ CFU/g
There is no significant difference between the examined samples (P> 0.05).

4. Conclussion:

The obtained results in the current study declared that the examined chicken samples contaminated with Enterobacteriaceae and coliforms microorganisms and this may be attributed to holding of such chicken in unhygienic conditions. So that strict hygienic measures should be applied on chicken meat.

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الملخص العربى

الجودة البكتيرية للحوم الدواجن المسوقة بمدينة الزقازيق

عبد السلام الديداموني حافظ [١] ، مني علاء عبد العظيم محمد [١] ، هبه أحمد عبدالله [٢] و رشا محمد البيومي [١]

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تعد لحوم الدواجن مصدر مهم من مصادر البروتين الحيوانى نظرا لاحتوائها على نسبة عالية من الحموض الامينية والفيتامينات والأملاح المعدنية والعناصر الغذائية الضرورية لبناء جسم الانسان وانتاج الطاقة كما أنها تتميز بالطعم المستساغ لدى الجميع وخاصة الأطفال والمرضى وكبار السن وذلك لإنخفاض سعرها مقارنة باللحوم الحمراء وباقى الطيور الأخرى. تتعرض ذبائح الدواجن اثناء ذبحها وتجهيزها ونقلها وتداولها فى الاسواق للتلوث بمختلف الميكروبات التى تؤدى الى فسادها قبل استهلاكها وايضا ميكروبات التسمم الغذائى التى تشكل خطرا على صحة المستهلك ولذلك كان هناك ضرورة ملحة لإستخدام بعض مزيلات التلوث للقضاء على أحد ميكروبات التسمم الغذائى المنتشرة فى لحوم وأحشاء الدجاج وهى الإيشيريشيا كولاى. تم تجميع ١٢٠ عينة عشوائية من ذبائح الدجاج الطازج يمثلها ٢٠ عينة من كل من الصدور، الأفخاذ،الأكباد والقوانص وجلد العنق وجلد فتحه الذرق من أماكن بيع الدواجن ذات المستويات الصحية المختلفة بمحافظة الشرقية لفحصها بكتيرلوجيا ، مع عزل وتصنيف ميكروب الإيشريشيا كولاى. وجاءت نتائج الفحوصات المختلفة على النحو التالي: أوضحت النتائج أن متوسط قيم العدد الكلي للميكروبات المعوية هي ٥.٥٤ ± ٠.٠٨٧ ، ٥.٤٥ ± ٠.٠٩٧ ، ٥.٥٤ ± ٠.٠٨٨ ، ٥.٤٠ ± ٠.٠٧٦ ، ٥.٣٩ ± ٠.٠٧٣ و ٥.٣٢ ± ٠.٠٦٤ لوغاريتم ١٠/جرام لكل من الأفخاذ ، الصدور ، الأكباد ، القوانص ،جلد الرقبه وجلد فتحه الذرق على الترتيب. كان متوسط قيم العدد الكلي للميكروبات القولونيه ٥.٥٠ ± ٠.١٧ و ٥.٦٦ ± ٠.٢٣ و ٥.٤٣ ± ٠.٢٢ و ٥.٢١ ± ٠.١٩ و ٥.٥٨ ± ٠.١٨ و ٥.٣٤ ± ٠.٢٦ لوغاريتم ١٠/جرام لكل من الأفخاذ، ،الصدور ، الأكباد ، القوانص ،جلد الرقبه و جلد فتحه الذرق على الترتيب.