Quality Assessment of Frozen Quail in Kafr EL-Sheikh Governorate

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Key words: Assessment Frozen Quail

ABSTRACT:

A total of fifty random samples of frozen quail carcasses (50) were collected from different markets at Kafr El-Sheikh Governorate to be examined either bacteriologically or chemically. The results revealed that the mean values for total psychrotrophic plate, *enterobacteriaee* and *Coliforms* counts were $5.1 \times 10^6 \pm 1.1 \times 10^6$, $8.6 \times 10^3 \pm 4.2 \times 10^3$ and $7.2 \times 10^3 \pm 2.9 \times 10^3$ (cfu/g), respectively. The respective mean values of yeast and mould were $7 \times 10^4 \pm 1.7 \times 10^4$ and $2.2 \times 10^5 \pm 2.7 \times 10^5$ (cfu/g). *Staph. aureus* and *E.coli* were isolated from 2(4%) and 18(36%) of the examined frozen quail samples while *Salmonella* failed to be isolated from the examined frozen quail samples. Moreover, the mean values of pH, total volatile nitrogen (TVN) (mg/100gm) and Thiobarbituric acid (TBA) (mg/Kg) were $5.8 \pm 0.01$, $7.1 \pm 0.32$ and $0.23 \pm 0.01$, respectively. The results were statistically evaluated. The possible sources of quail meat contamination, the Public health importance of the isolated bacteria and the hygienic measures which should be imposed were discussed.

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1. INTRODUCTION

Quail meat is a sweet and delicate white game meat with extremely low skin fat and low cholesterol value; also it is rich in micronutrients and a wide range of vitamins including vitamin B6, niacin, thiamin, panthonic acid and riboflavin, folate and vitamin E and K. It is therefore recommended for people with high cholesterol levels and those who want to maintain a low level of cholesterol, Michael Imchen,(2014).

The wild quails were exposed to many stress factors which cause depletion of muscle glycogen and make the gut more permeable to bacteria resulting in high bacterial population in muscle and reducing meat quality and shelf-life. Lawrie, R.A. (1972). In addition, (TVN) can be considered as a reliable measure indicating the quality of various food articles depending on the breakdown of their proteins (Warries, 2000). Also, Lipid oxidation is responsible for reduction in nutrition quality as well as changes in flavor. Therefore the present investigation was designed to throwout light on the bacterial quality of frozen quail meat through determination of psychrotrophic Plate Count (SPC), *Enterobacteriaee* count, *Coli* forms count, mold and yeast count, isolation of *Staphylococci*, *Escherichia coli* and *Salmonella*. In addition to some chemical parameters as determination of pH, total volatile nitrogen (TVN), determination of and Thiobarbituric acid number (TBA).

2. MATERIALS AND METHODS

2.1-Collection of samples:

A total of fifty random samples of frozen quail carcasses (50) were collected from different markets at Kafr El-Sheikh Governorate and transferred to the laboratory without delay in an insulated ice box. The samples were subjected to the following examinations.

2.2-Bacteriological examination:

2-2-a. Preparation of samples: preparation of samples were done as described in APHA,(2001).

2-2-b. Psychrotrophic Plate Count (CFU/gm): It was carried out according to FAO (1992) using standered
plate count agar. The plates were incubated at 7°C for 10 days.

2-3-c. **Coliform count (MPN/gm):** It was carried out according to FDA (2002).

2-4-d. **Enterobacteriaece count (CFU/gm):** It was carried out according to FAO (1992).

2-5-e. **Staphylococcus aureus count:** It was carried out according to FADA (2001).

2-6-f. **Total mold and yeast count:** It was carried out according to Bailary and Scott (1998).

2-7-g. **Isolation of E-coli and Salmonella:** It was carried out according to AOAC (1999).

**2.3-Chemical evaluation:**

2.3-1. **Determination of pH value:** It was carried out according to Pearson (1984).

2.3-2. **Determination of Total Volatile Basic Nitrogen (TVBN) mg/100gm:** It was done according to FAO (1980).

2.3-3. **Determination of Thiobarbituric Acid Number (TBA) mg/Kg:** It was carried out according to Pikul et al. (1983).

**3. RESULTS and DISCUSSION**

In Egypt, quail meat is being marketed through many supermarkets and its consumers have greatly increased, wild quails were found in a lot of number on north beaches of Egypt and some of these birds were hunted and sold in the local markets.

Results recorded in table (1) showed that the mean value of psychrotrophic plate (cfu/g) was $5.1 \times 10^5 \pm 2.7 \times 10^4$. This result was higher than that reported by Edris et al., (2011), $(9 \times 10^4 \pm 1.43 \times 10^4$ cfu/g). The psychrotrophic counts of frozen quail may be attributed to contamination of materials and unsatisfactory sanitation during handing, processing and distribution as well as inadequate chilling and freezing that may increase the existing organisms. This held the view reported by Thatcher and Clark, (1973). On the other hand the bacterial count of any food article is not indicative for its safety for consumption, yet it was of more importance in judging the hygienic conditions under which it had been produced, handled and stored Jay, (1997).

**Table (1): Statistical analytical results of bacteriological evaluation of examined frozen quail samples (n=50).**

<table>
<thead>
<tr>
<th>Counts</th>
<th>Mean± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychrotrophic</td>
<td>$5.1 \times 10^5 \pm 2.7 \times 10^4$</td>
</tr>
<tr>
<td>Enterobacteriaece</td>
<td>$8.6 \times 10^3 \pm 4.2 \times 10^3$</td>
</tr>
<tr>
<td>Coliforms</td>
<td>$7.2 \times 10^3 \pm 2.9 \times 10^3$</td>
</tr>
</tbody>
</table>

**Table (2): Statistical analytical results of mycological evaluation of examined frozen quail samples (n=50).**

<table>
<thead>
<tr>
<th>Counts</th>
<th>N0</th>
<th>%</th>
<th>Mean± SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total yeast</td>
<td>46</td>
<td>92</td>
<td>$7 \times 10^4 \pm 1.7 \times 10^4$</td>
</tr>
<tr>
<td>Total mold</td>
<td>48</td>
<td>96</td>
<td>$2.2 \times 10^5 \pm 2.7 \times 10^4$</td>
</tr>
</tbody>
</table>

**Table (3): Incidence of Staph.aureus, E.coli and Salmonella in frozen quail (n=50)**

<table>
<thead>
<tr>
<th>Isolated organism</th>
<th>No.of+ve samples</th>
<th>%</th>
<th>No.of –Ve samples</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staph.aureus</td>
<td>2</td>
<td>4</td>
<td>48</td>
<td>96</td>
</tr>
<tr>
<td>E.coli</td>
<td>18</td>
<td>36</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>Salmonella</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table (4): Chemical analysis of frozen quail (n=50).

<table>
<thead>
<tr>
<th>Chemical parameters</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean± SE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>5.7</td>
<td>6.01</td>
<td>5.8±0.01</td>
</tr>
<tr>
<td>TVN mg/100gm</td>
<td>3.9</td>
<td>11.4</td>
<td>7.1±0.32</td>
</tr>
<tr>
<td>TBA mg/kg</td>
<td>0.13</td>
<td>0.42</td>
<td>0.23±0.01</td>
</tr>
</tbody>
</table>

In the same table the results showed that the mean value Enterobacteriaceae counts of frozen quail meat value was $8.6 \times 10^3 \pm 4.2 \times 10^3$. This result was nearly similar to that recorded by Edris et al., (2011) $(1.18 \times 10^4 \pm 4.55 \times 10^4$ cfu/g) and El-Dengawy and Nassar, (2010) $(4 \times 10^3 \pm 0.84 \times 10^3$ cfu/g). So, their presence indicate poor sanitation of quail and mishandling (ICMSF, 1978). Also Presence of coliform bacteria in great number may be responsible for inferior quality of meat resulting in economic losses which constitute a public health hazard Tront, and Olburn, (1995).

Coliform count with mean value of $7.2 \times 10^3 \pm 2.9 \times 10^3$ cfu/g, in (Table 1)These results similar to Edris et.al.,(2011) $(5.7 \times 10^3 \pm 1.45 \times 10^3$ cfu/g), and also nearly similar to El-Dengawy and Nassar , (2010) $(3 \times 10^3 \pm 0.56 \times 10^3$ cfu/g). The presence of coli forms may be attributed to direct or indirect faecal contamination from either human or animal sources.

Table (2) showed that yeast and mold counts could be detected in $46(92\%)$ and $48(96\%)$ out of $50$ examined frozen quail samples, respectively. The mean value of yeast and mold counts cfu/g were $7 \times 10^4 \pm 1.7 \times 10^4$ and $2.2 \times 10^5 \pm 2.7 \times 10^4$, respectively. These results were nearly similar to those reported by Mostafa Hayam, (2001) $(5.7 \times 10^3 \pm 2.9 \times 10^3$) and higher than Mohsen, (2005) $(1.2 \times 10^3 \pm 1.0 \times 10^3$). Quail carcass like other kind of food has all nutrients required for mold growth which distributed in nature as air, water, manure soil dust, ect. and could contaminate meat and constituting public health hazard. As molds induce certain undesirable changes as off flavors, color defects and actual rots. Also certain molds have the ability to produce mycotoxins which are implicated in some cases of food poisoning and liver cancer Mossel, (1982) and Varshney et al, (1991).

The data found in table (3) showed that the Staphylococcus.aureus present in only $2$ samples ($4\%$) from the examined samples. These results lower than that recorded by Edris, et.al, (2011) who isolated Staph.aureus from $40\%$ of the examined samples. While these results nearly similar to Mansour, (1997) who failed to detect S. aureus. Presence of S. aureus in a food indicated contamination of handlers and inadequately cleaned equipments. S. aureus recorded in cases of severe diarrhea as well as cases of food poisoning enteritis among consumer Davis and Board, (1998).

Table (3) also showed that the E.coli isolated from $18$ ($36\%$) from the examined samples. This result higher than that recorded by Edris, et.al, (2011) who isolated E.coli from $4\%$ of examined samples. While these results nearly similar to El-Dengawy and Nassar,( 2010) who isolated E.coli from $30\%$ of the examined samples. The main habitat of E.coli is the intestinal tract of human and animal. So its presence indicative to faecal contamination. Moreover, many strains of organism are enteropathogenic and give rise to acute diarrheal hemorrhagic enteritis in adults (Law, 2000). While in the same table Salmonella cannot isolated from any examined samples.

So hygienic measures should be applied as ante-mortem inspection before slaughtering. Instruments used in slaughtering should be periodically cleaned and disinfected. Bleeding of slaughtered quail should be through trough or channels in order to minimize aerial contamination. Periodical sanitation of quail slaughter halls, utensils, equipments, chilling rooms and freezing cold stores. All these precautions must be followed to improve the hygienic quality of foodstuff.

Chemical analysis of frozen quail samples.

Hydrogen ion concentration (pH):

Results recorded in table (4) revealed that pH values
of examined frozen quail samples ranged from 5.7 to 6.01 with mean value of 5.8±0.01. These results nearly agree with El-Shehry-Eman, (2012) with mean value of (5.91) and Youssf.Fatma, (2013) with mean value of 5.64±0.02. The higher results were achieved by Shedeed, (1999) with mean value of (6.10). Afifi- Jehan, (2000) with mean value of (6.15). The decrease in pH value may be attributed to the breakdown of glycoprotein with the formation of lactic acid, and the increase of pH may be due to the partial proteolysis. Poultry meat with a pH below 5.8 had a pale color, while meat with higher pH had dark color and has a great risk on human health. However, the ideal pH for meat is between 5.8 and 6.3 (Pearson and Gillette, 1996).

**Total Volatile Nitrogen (TVN):**

Results in table (4) showed that TVN (mg%) of examined frozen quail samples ranged from 3.9 to 11.4 with mean value of 7.1 ± 0.32. Higher results obtained by Youssf.Fatma, (2013) with mean value of 9.11± 0.33(mg%) and Afifi- Jehan, (2000) with mean value of 13.87± 0.18(mg%). Ammonia is one of the most spoilage end products in spoiled meat and meat products which is directly responsible for spoilage odors and flavors, it is considered as an indicator for amino acid degradation by bacteria and it can be measured as total volatile basic nitrogen Gill,(1983). Accordingly, TVN can be considered as a reliable indicative measure for the quality of various food articles specially poultry and its products. According to Egyptian Organization for Standardization E.O.S, (2005) for poultry meat, all the examined samples were within the accepted level as TVN were lower than 20 mg%.

**Thiobarbituric acid number (TBA):**

From the results recorded in table (4) it is evident that TBA (mg%) in the examined samples of quail meats were varied from 0.13 to 0.42 with an average of 0.23± 0.01. Lower results obtained by Afifi and Gehan, (2000) (0.119mg %) and Youssf.Fatma, (2013) (0.09mg%). The oxidative rancidity in poultry meat was evaluated by measuring malonaldehyde in fat meat with an improved Thiobarbituric acid (TBA) assay with antioxidant protection Abd El-Kader, (1996). According to Egyptian Organization for Standardization E.O.S., (2005) for poultry meat, all the examined samples were within the accepted level as TBA mg% were lower than 0.9 mg%.

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