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Chemical indices of pigeon and quail meat quality

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A B S T R A C T

A grand total of 80 random samples of breast meat including fresh pigeon, frozen pigeon, fresh quail and frozen quail (20 for each) were collected from different shops, supermarkets and hypermarkets in different localities in Kalyobia governorate to examine their chemical quality. The investigation showed that pH values were 5.9, 5.8, 5.95 and 5.85 for the examined fresh pigeon, fresh quail, frozen pigeon and frozen quail samples, respectively. Also, TVN values (mg %) were 5.3, 4.5, 7.59 and 6.08 the examined fresh pigeon, fresh quail, frozen pigeon and frozen quail samples, respectively. While, TBA values (mg/Kg) were higher in frozen quail samples (0.218±0.01) than frozen pigeon (0.203 ±0.01) and in fresh quail (0.186 ±0.1) than fresh pigeon samples (0.144±0.096).

Keywords: pigeon, quails, meat quality, PH, TVN, TBA

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1. INTRODUCTION

Pigeon has high nutritional value, low fat content, high digestibility and being superior through its chemical composition to other types of meat from other species (Gontariu and Buculei, 2009). Quail meat like most fowl meats is a valuable source of protein with very good amino acid profile (Genchev et al., 2008).the thiobarbituric acid (TBA) test has been widely used for measuring oxidative rancidity in fat containing food,. The T.B.A. test is a sensitive test for the decomposition of products of highly unsaturated fatty acids (Melton, 1983).

The decrease in pH value in poultry meat may be attributed to the breakdown of glycogen with the formation of lactic acid and the increase of pH may be due to the partial proteolysis leading to the increase of free alkaline groups depending on the condition of such changes. Besides, higher pH values of breast meat could be due to the increase in the lactic acid concentration via anaerobic metabolism in breast meat (Jay, 1972). 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).

Frozen meat is likely to undergo changes in physical and chemical properties affecting the nutritive value and quality which are important for the consumer acceptance (Miller et al., 1980). Relatively, little is known about the quality and composition of these types of poultry meat. Therefore, this study was conducted to throw out light on the chemical quality of fresh and frozen pigeon and quail meat and their benefits on public health.

2. MATERIALS AND METHODS

2.1. Samples:

A grand total of 80 random samples of breast meat of fresh pigeon, frozen pigeon, fresh quail and frozen quail (20 for each) were collected from different shops, supermarkets and hypermarkets in different localities in Kalyobia governorate. All samples were kept in an ice box during transportation to the laboratory with minimum time of delay and analyzed as rapidly as possible for evaluation of its chemical quality.

2.2. Determination of chemical quality indices

2.2.1. Determination of chemical quality indices

In a blender, approximately 10 g of the examined sample were blended in 10ml of distilled water. The homogenate was left at room temperature for 10 min. with continuous shaking. The pH value was determined by using an electrical pH meter (Bye model 6020, USA).

2.2.2. Determination of Total Volatile Nitrogen (TVN) (FAO, 1980)

In a clean dry beaker, 10g of the examined sample were added to 30 ml of distilled water and thoroughly mixed by a blender for 2 min. Thus, 2 drops of 0.02 M HCl were added to bring the pH value to 5.2. The homogenate was slowly heated to 70°C and then cooled to room temperature and filtered into the inner compartment of Conway dish then 2ml of 0.01M HC1 were added.The outer ring was filled with 2ml of the sample extract and 1ml of saturated potassium carbonate (KCO3). The Conway unit was rotated as gently as possible and the dish was covered and incubated at 36°C for 2 hours, HCl in the inner ring was titrated against 0.01M NaOH by using methyl red indicator (ml).

TVN mg % = 26.88 x (2-T2). Where, T2 = volume of NaOH consumed in the titration.

2.2.3. Determination of Thiobarbituric acid number (TBA) (Vyncke, 1970)

In a clean dry beaker, 20 g of the examined sample were blended with 100 ml of 7.5% trichloroacetic acid solution for 2 min. and the homogenate was filtered, 5 ml of TBA reagent (0.02 M TBA in distilled water) were added to 5ml of the filtrate in test tubes with screw caps. The tubes were placed in a water bath for 40 min. and the absorbance of the resulting color was measured by using spectrophotometer (Spectronic 21, Italy) at wave length 538nm. TBA values were recorded as mg malonaldehyde / kg of sample indicator.

Concentration of malonaldehyde (mg/kg) = 0.016 + 2.872 X. Where, X = the absorbance.

3. RESULTS

It is evident from the results recorded in Table (1) that pH % is higher in frozen pigeon followed by fresh pigeon then frozen quail and finally fresh quail. At the same time the observed pH of the majority of samples remained within the acceptable level (5.6-6.2) according to EOS (2005) and 5.8 and 6.3 according to (Pearson and Gillette, 1996).

Table (2) reported that TVN % % is the highest in frozen pigeon followed by frozen quail then fresh pigeon and finally fresh quail samples.

Concerning the examined samples, the pigeon breast samples had the highest proportion of TVN mg % followed by quail meat samples. This means that the pigeon meat samples are the most rapid samples for degradation of protein. But all the samples were within the accepted limits (not more than 30mg %) according to (Pearson,

1984).and (lower than 20mg %) according to EOS (2005).

Table (1): Statistical analytical results of pH value in the examined samples of fresh and frozen pigeon and quail meat (n=20).

Meat type	Min.	Max.	Mean ± S.E*	EOS
Fresh pigeon	5.7	6.07	5.88±0.02	5.6-6.2
Frozen pigeon	5.8	6.1	5.95±0.02	
Fresh quail	5.7	5.9	5.81±0.01	
Frozen quail	5.7	5.9	5.85±0.01	

S.E* = standard error of mean + = Significant differences between products (P<0.05)

Table (2): Statistical analytical results of TVN values in the examined samples of fresh and frozen pigeon and quail meat (n=20).

Meat type	Min.	Max.	Mean ± S.E*	EOS
Fresh pigeon	3.3	7.5	5.36±0.3	>20mg/ 100gm
Frozen pigeon	4.6	10.3	7.59±0.3	
Fresh quail	2.7	6.9	4.52±0.3	
Frozen quail	3.2	8.5	6.08±0.3	

S.E* = standard error of mean + = Significant differences between products (P<0.05).

Table (3): Statistical analytical results of TBA values in the examined samples of fresh and frozen pigeon and quail meat (n=20).

Meat type	Min.	Max.	Mean ± S.E*	EOS
Fresh pigeon	0.09	0.22	0.144±0.096	>0.9mg/ 100gm
Frozen pigeon	0.11	0.29	0.203±0.012	
Fresh quail	0.11	0.25	0.186±0.01	
Frozen quail	0.14	0.35	0.218±0.015	

S.E* = standard error of mean + = Significant differences between products (P<0.05).

Table (3) reported that TBA % is higher in frozen quail samples than frozen pigeon and in fresh quail than fresh pigeon samples. All the examined samples were within the accepted limits (lower than 0.9 mg %) according to EOS (2005) and (not more than 0.9mg/kg) according to (Pearson, 1984).

4. DISCUSSION

The chemical and nutritional composition of poultry meat greatly varied from one species to another (Lawrie, 1998).The achieved results of pH in table (1) come in accordance with those obtained by Hassan (2013) where 5.50 to 5.90, de la Torre et al. (2012) where 5.5 to 6.5 during the storage time, Ragab (1999) where 5.97 ± 0.03 for packed frozen pigeon. Higher results were recorded by Ragab (1999) where 7.11 ± 0.03, 6.02 ± 0.02 of unpacked fresh pigeon and unpacked frozen pigeon. The obtained values from the examined samples of the quail breast muscle were nearly similar to those recorded by Abd El-All (1997) where 5.61 to 5.71, Abd El-All (2001) where 5.87 for fresh quails, Abd El-All (2001) where 5.6 to 6.6 for frozen quail, Baumgarther et al. (1990) where 5.1to 6.5%. Lower results were obtained by Boni et al. (2010) (6.53-6.62), higher results were recorded by Genchev et al. (2008) where 6.42 to 6.17. The decrease in pH value in poultry meat may be attributed to the breakdown of glycogen with the formation of lactic acid. The increase of pH may be due to the partial proteolysis leading to the increase of free alkaline groups depending on the condition of such changes. Besides, higher pH values of breast meat could be due to the increase in the lactic acid concentration via anaerobic metabolism in breast meat (Jay, 1972). Poultry meat with a pH below 5.8 had a pale color, while meat with higher pH was dark in 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).

The achieved results in table (2) of TVN (mg %) were lower than those obtained by Hassan (2013) (8.30 to 14.20), Afifi (2000) (12.49 to 15.16) for pigeon. Higher results were recorded by Abd El-All (2001) where 10.6 to 18.1 for fresh quail samples and 1.09 to 20.8 for frozen quail samples.

Concerning the examined samples, the pigeon breast samples had the highest proportion of TVN mg % followed by quail meat samples. This means that the pigeon meat samples are the most rapid samples for degradation of protein. Accordingly, TVN can be considered as a reliable indicative

measure for the quality of various food articles specially poultry and its products. In general, TVN in poultry meats may be increased as the days of storage increased (Reddy et al., 1970). The achieved results of TBA (mg / Kg) in table (3) were higher than those obtained by Hassan (2013) where 0.01 to 0.06, while, lower than those recorded by Modi et al. (2006) where 1.5 to 2.4. The obtained values from the examined samples of the quail breast muscle were nearly similar to those recorded by de la Torre et al. (2012) where 0.10– 0.25, Afifi (2000) where 0.051to 0.223, also higher results were recorded by Abd El-All (2001) where 0.24 to 0.76 for fresh quail and 0.6 to 1.6 for frozen quail.

Concerning the examined samples, the quail meat samples had the highest proportion of TBA as compared with pigeon meat samples as the quail meat had higher percent of fat than others. 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).

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الدلائل الكيميائيه لجوده لحوم الحمام و السمان.

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الملخص العربي

أجريت هذه الدراسة على عدد 80 عينة من لحوم الحمام والسمان منها الطازجة والمجمدة (20 من كل منها) والتي تم جمعها عشوائيا من المحلات والسوبر ماركت فى نطاق محافظ القليوبية هذا وقد أسفرت نتائج الخصائص الكيمائية و الجودة للحوم الحمام والسمان ممثلة فى قياس نسبة تركيز أيون الهيدروجين ، قياس نسبة تركيز النيتروجين القلوي المتصاعد ،قياس نسبة حمض الثيوباربيتيورك. وكانت النتائج كالاتي: 5,88 ± 2, 0، 5,36 ± 0,31 ، 144, 0± 0,096فى صدور الحمام الطازجة على التوالي. 5.81 ± 015, 0 ، 4.52 ± 31, 0 ، 186,.0 ± 01, 0فى صدور السمان الطازجة على التوالي .5,95 ±.02, 0، 7,59 ±36,. 0، 203,.0 ±0125, 0 فى صدور الحمام المجمد على التوالي . 5,85 ± 015, 0، 08,.6 ± 0,37 ، 0,218 ± 015, 0فى صدور السمان المجمد على التوالي. وهذا وقد تم مناقشة الخصائص الكيمائية وجودة هذه اللحوم ومدى تأثيرها على صحة المستهلك والإجراءات الصحية الواجب اتخاذها أثناء تجهيز تلك المنتجات للحفاظ عليها للحصول على منتج نهائي صحي ذو كفاءة عالية لا يشكل خطر ولا يؤثر على صحة المستهلك.

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