QUALITY EVALUATION OF SOME LOCALLY MANUFACTURED CHICKEN MEAT PRODUCTS

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A B S T R A C T

One hundred random samples of some chicken meat products randomly collected from supermarkets in El Menofya governorate, Egypt, represented by chicken pane, chicken nuggets, grilled chicken steaks, chicken schawrma and grilled chicken breast (20 of each). Samples were examined for sensory, chemical and microbiological evaluation to assure their quality. The obtained results indicated that; the overall organoleptic scores of the examined samples of chicken pane, chicken nuggets, grilled chicken steaks, chicken schawrma and grilled chicken breast were 7.90, 7.20, 7.10, 7.05 and 6.40, respectively. The chemical examination revealed that the mean values of pH, TVN and TBA were 8.18, 33.85 and 0.44 for chicken pane , 8.33, 35.61 and 0.29 for chicken nuggets , 8.20, 35.35 and 0.26 for grilled chicken steaks , 8.16, 37.14 and 0.31 for chicken schawrma and 8.31, 33.85 and 0.07 for grilled chicken breast respectively .The obtained results of microbiological examination of the examined products showed the highest (cfu/g) ranged from 3.04×105 to 5.99×106 for the examined samples of chicken pane while the total *Enterobacteriaceae* count ranged from 6.51×102 to 2.03×103 with the highest load was recorded for chicken nuggets and the total fungal count for these products ranged from 0 to 9.93×105 with the highest value of fungal count was in the examined samples of chicken nuggets .The correlation between APC and other organoleptic and chemical parameters of such products was recorded.

Keywords: chicken meat products, chemical evaluation, microbiological evaluation

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1. INTRODUCTION

Chicken and Chicken meat products are good sources of animal protein of high biological value, which contains all the essential amino acids required for human nutrition, besides that they contain higher proportion of unsaturated fatty acids and less cholesterol especially when skin is removed (Shedeed, 1999) . The acceptance of further processed chicken meat products depends upon overall acceptance, color, odor, taste and consistency. So, consumers had given much greater choice over the foods which are more selective, of high quality and cheap about the value of money. Finally, the product quality became more significant factor in meat products marketing (Potter, 2001, Agamy and Hegaz, 2011). Total bacterial, *Enterobacteriacae* and fungal counts are considered as indices of quality,which give an idea about the hygienic measures during further processing and help in assessing the keeping quality of further processed chicken meat products (Aberle et al.,2001). Chemical analysis of further processed chicken meat products is greatly varied, so, testing of the final products is a common practice in cooked and uncooked chicken meat products

and applied to ensure the compliance of such products with the legal and composition of standards written on the label (Beckers, 1998). Poultry meat products may be contaminated during processing and can harbor multiple types of pathogenic bacteria capable of causing puplic health hazard as *E.coli* and *B.cereus* which were of main concern (Waldroup, 1996). Therefore, the present study was planned to throw out a light on the quality of some further processed chicken meat products randomly collected from El-Menofya governorate supermarkets.

1. MATERIALS AND METHODS

1.1. Samples:

A total of 100 random samples of frozen half cooked chicken meat products, represented by chicken nuggets; chicken pane, grilled chicken breast, chicken schawrma and grilled chicken steak (20 of each) were collected from different supermarkets in Menofya governorate. Each sample was aseptically transferred, without delay, in an insulated ice box to the laboratory and then subjected to the following examination.

1.2. Organoleptic examination

It was carried out by 10 panelists (staff members of Food Science & Technology Department, Faculty of Home Economics Al Azhar University which were frequently used. The panelists were asked to evaluate color, taste, flavor, texture and overall acceptability as described by Smith et al., (1973). A score 1 is being disliked extremely and 10 being like extremely. The overall acceptability was calculated. All panelists' scores were statistically analyzed.

1.3. Sample preparation (APHA,1992)

Twenty-five grams of the examined samples were stomached using stomacher (seward stomacher80, Biomaster, serial no. 46464, England) with 225 ml of sterile buffered peptone water (0.1%) to give a dilution of (10-1), from which further serial dilutions were prepared.

1.4. Microbiological examination:

Determination of APC (ICMSF, 1978).
Determination of Enterobacteriaceae count (ICMSF, 1978).
Determination of total mould and yeast count (Cruick shanks et al., 1975).

1.5. chemical analysis

Plasma Determination of pH value (AOAC, 2000).
Determination of total volatile nitrogen (TVN) (mg %) FAO (1980).
Determination of Thiobarbituric acid number (TBA) (mg/ kg %) (Kirk and Sawyers, 1991).

1.6. Statistical Analysis

The obtained results were statistically analyzed by application of Analysis of Variance (ANOVA) test according to Feldman et al. (2003).

3. RESULTS

The results achieved in table (1) revealed that the mean scores of colour, flavour, texture, taste were 7.60, 8.00, 8.10, 7.80 for chicken pane, 6.75, 7.00, 8.10 , 7.25 for chicken nuggets , 6.40, 7.40, 7.60, 7.45 for grilled chicken steaks , 6.30, 7.35, 7.55, 7.45 for chicken schawrma and 5.35, 6.60, 7.10, 5.60 for grilled chicken breast, respectively.
The results achieved in table (2) revealed that the mean values of pH ,TVN(mg%) and TBA(mg/kg) were 8.18, 33.85, 0.44 for chicken pane , 8.33, 35.61, 0.29 for chicken nuggets , 8.20, 35.35, 0.26 for grilled chicken steaks , 8.16, 37.14, 0.31 for chicken schawrma and 8.31, 33.85, 0.07 for grilled chicken breast .

Table (1): Mean values of organoleptic scores in the examined locally manufactured chicken meat product samples (n=20)

Chicken meat products	color	flavor	texture	taste	over all acceptance
Chicken pane	7.60	8.00	8.10	7.80	7.90
Chicken nuggets	6.75	7.00	8.10	7.25	7.20
Grilled chicken steaks	6.40	7.40	7.60	7.45	7.10
Chicken shawerma	6.30	7.35	7.55	7.45	7.05
Grilled chicken breast	5.35	6.60	7.10	5.35	6.40

Table (2) Mean values of pH, TVN (mg%) and TBA (mg/kg) in the examined locally manufactured chicken meat product samples (n=20) .

Chicken meat products	pH	TVN(mg%)	TBA(mg/kg)
Chicken pane	8.18	33.85	0.44
Chicken nuggets	8.33	35.61	0.29
Grilled chicken steaks	8.20	35.35	0.26
Chicken shawerma	8.16	37.14	0.31
Grilled chicken breast	8.31	33.85	0.07

Table(3):Mean values of aerobic plate count (APC),Enterobacteriaceae count and fungal count (CFu/g) in the examined locally manufactured chicken meat product samples (n=20) .

Chicken meat products	APC	*Enterobacteriaceae counts*	Fungal counts
Chicken pane	$5.99\times10^6 \pm 0.63\times10^6$	$1.14\times10^3 \pm 0.19\times10^3$	$1.35\times10^4 \pm 0.22\times10^4$
Chicken nuggets	$4.78\times10^5 \pm 0.51\times10^5$	$2.03\times10^3 \pm 0.35\times10^3$	$9.93\times10^5 \pm 2.17\times10^5$
Grilled chicken steaks	$1.42\times10^6 \pm 0.27\times10^6$	$6.51\times10^2 \pm 1.12\times10^2$	$2.08\times10^3 \pm 0.35\times10^3$
Chicken shawerma	$3.89\times10^5 \pm 0.46\times10^5$	$9.79\times10^2 \pm 2.28\times10^2$	$1.70\times10^3 \pm 0.14\times10^2$
Grilled chicken breast	$3.04\times10^5 \pm 0.39\times10^5$	$6.94\times10^2 \pm 1.43\times10^2$	-

Table (4): Correlation coefficient (r) between APC, organoleptic and chemical scores in the examined samples of locally manufactured chicken meat products.

	Chicken pane	Chicken nuggets	Grilled chicken steaks	Chicken shawerma	Grilled chicken breast
APC	-0.68**	-0.45*	-0.31	-0.50*	-0.39*
1. Color					
2. Flavor	-0.53*	-0.42*	-0.63**	-0.48*	-0.71**
3. Texture	-0.40*	-0.29	-0.19	-0.22	-0.36*
4. Taste	-0.61**	-0.37*	-0.35*	-0.43*	-0.47*
5. pH	+0.28	+0.52*	+0.38*	+0.30	+0.25
6. TVN	+0.57**	+0.74**	+0.41*	+0.26	+0.62**
7. TBA	+0.21	+0.35*	+0.58**	+0.46*	+0.74**

* = Significant correlation ** = High significant correlation.

The results achieved in table (3) revealed that the mean scores of APC/g , *Enterobacteriaceae* counts , fungal counts were 5.99×106 ± 0.63×106 , 1.14×103 ± 0.19×103 , 1.35×104 ± 0.22×104 for chicken pane , 4.78×105 ± 0.51×105 , 2.03×103 ± 0.35×103 , 9.93×105 ± 2.17×105 for chicken nuggets , 1.42×106 ± 0.27×106 , 6.51×102 ± 1.12×102 , 2.08×103 ± 0.35×103 for grilled chicken steaks , 3.89×105 ± 0.46×105 , 9.79×102 ± 2.28×102 , 1.70×103 ± 0.14×102 for chicken shawerma , 3.04×105 ± 0.39×105 , 6.94×102 ± 1.43×102 , - for grilled chicken breast, respectively.

4. DISCUSSION

During the last decade, the demand of ready to eat Chicken meat products has increased in Egyptian food markets and receive a real consumer preferability because they considered as quick easily prepared meat meals and solve the problem of shortage in fresh meat of high price which is not within the reach of large numbers of families with limited income.

Treatment Conversion of raw Chicken carcasses into further processed chicken meat products, as cold cuts, reconstructed products or breaded products are improve the juiciness, flavor, shelf life and water holding capacity of such product (Sahoo et al., 1996).

Appearance, taste, aroma, and texture of meat can generally produce a consumer's decision to purchase meat. Flavor comprises mainly taste and aroma and involves in consumers' meat purchasing behavior and preferences even before the meat is eaten (Shahidi, 1989, Sitz et al., 2005).

The results achieved in table (1) revealed that the mean scores of color , flavor , texture and taste were 7.60, 8.00, 8.10 and 7.80 for chicken pane, 6.75, 7.00, 8.10 and 7.25 for chicken nuggets , 6.40, 7.40, 7.60 and 7.45 for grilled chicken steaks , 6.30, 7.35, 7.55 and 7.45 for chicken schawrma and 5.35, 6.60, 7.10, 5.60 for grilled chicken breast .

The obtained results of microbiological examination agreed with those obtained by Al-Dughaym and Altabari (2010) for APC/g, Hefnawy and Moustafa (1990) for total enterobacteriaceae count and Helmy and Mahmoud (2005) for total fungal count.The contamination of half cooked chicken meat product samples may be due to inadequate sanitary conditions during processing, bad handling, dirty equipment, polluted water, contaminated cold stores and temperature fluctuation during storage (Saad et al.,1989, Refaie et al.,1991, Farghaly, 1998).

Considerable variation in the color of broiler breast meat fillet obtained from commercial processing plants, a significant correlation between muscle pH and changes in color were recorded (Fletcher 1995) .

The obtained results of chemical examination were nearly similar to those obtained by Hassanin and Hassan (2003) for pH, Fathy (2012) for TVN and Koreleski and Swiatkiewicz (2006) for TBA values.

PH value is an indicator of keeping quality of meat and assesses the shelf-life of the products (Jay, 1972). TVN measurement is considered as a reliable indicator of various chicken meat product specially during storage where protein break down (ammonia) may occurr due to microbial growth and its proteolytic enzymes (Yassien ,2003 ,Alina and Ovidiu 2007), Furthermore, the variations of TBA values may be attributed to fat contents of the examined chicken meat products and usually considered as an index of lipid oxidation which related to the sensory characteristics as rancidity (Salem,1992 ,Raharjo and Sofos, 1993) .

The results recorded in table (4) indicated that pH values of the examined chicken meat product samples were negatively affected with color, flavor and taste of such products

at varying degrees. In contrast, there was significant positive correlation between pH from one side and TVN &TBA of the examined samples from the other side.

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مجلة بنها للعلوم الطبية البيطرية
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تقييم جوده بعض منتجات لحوم الدواجن محليه الصنع.

همت مصطفى ابراهيم ، أماني محمد سالم ، محمود سعيد شنب
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الملخص العربي

أجريت هذه الدراسة لتقييم جوده بعض منتجات لحوم الدواجن محليه الصنع حيث تم تجميع 100 عينه من بانيه الدجاج، ناجتس الدجاج، شيش طاووق الدجاج المشوي، شاورما الدجاج، صدور الدجاج المشوية (20 عينه من كل نوع) من محلات السوبر ماركت المختلفة في محافظه المنوفية . تم اختبار العينات من النواحي الحسية،الكيميائية، الميكروبية لتقييم مدى جودتها .هذا وقد كانت نتائج الفحص الحسي لبانيه الدجاج، ناجتس الدجاج، شيش طاووق الدجاج المشوى، شاورما الدجاج، صدور الدجاج المشوية هى7.90 ،7.20، 7.10، 7.05 ،6.40 على التوالى. بينما كانت نتائج الفحص الكيميائي لقيم درجه الحموضة، مجموع المركبات النيتروجينية المتطايرة، حامض الثيوباربيتيوريك هي : 8.18، 33.85، 0.44 لبانيه الدجاج ،8.33، 35.61، 0.29 لناجتس الدجاج ،8.20، 35.35، 0.26 لشيش طاووق الدجاج المشوي،8.16، 37.14، 0.31 لشاورما الدجاج ،8.31، 33.85، 0.07 لصدور الدجاج المشوي على التوالى . بينما أسفر الفحص الميكروبي أن بانيه الدجاج سجل أعلى قيمه للعد الكلى للبكتريا الهوائية والذى تراوح بين3.04 ×105، 5.99×106. بينما تراوح العد الكلى للبكتريا القولونيه بين 6.15 x102 إلي3 2.03 x 10 وسجل ناجتس الدجاج أعلى قيمه للعد الكلى للبكتريا القولونية. بينما تراوح العد الكلى للفطريات من 0 إلي 9.93 x 105 وكانت أعلى قيمة لناجتس الدجاج . تم تعيين العلاقة بين العد الكلى للبكتريا الهوائية والقياسات الحسية والكيميائية للمنتجات موضع الدراسة.

. **(مجلة بنها للعلوم الطبية البيطرية: عدد 26(2):143- 149, يونيو 2014)**