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Chemical composition of chicken of various commercial brands available in market.

R.Prasanna Kumar[1] and M.Sahitya Rani[2]
Department of Livestock Production Management, College of Veterinary Science, Korutla, Karimnagar Dist, Telangana-505326.
Department of Livestock Products Technology, College of Veterinary Science, Korutla, Karimnagar Dist, Telangana-505326.

Abstract: *The chemical composition of the meat from various cuts of poultry obtained from three commercial brands (brand I, II and III) of chicken from different processing plants available in the Saudi Arabian market were studied. Six raw meat samples of whole chicken and mixed portions (Breast fillet with skin, breast fillet without skin, drumsticks with skin, thigh cut skin on bone in and wings with skin in) from each brand were collected on same production date. The collected samples were analyzed for pH, moisture, fat percent and protein content. The results revealed that, in whole chicken the pH values and moisture content differ significantly (P<0.05) among different brands. The fat percent is significantly higher in brand I (22.30±0.91) where as brand II (18.06±0.13) has significantly higher protein content. The pH, moisture, fat percent and protein content of mixed portions differ significantly among different brands. However, the fat percent of whole chicken, breast fillet with skin was higher by 8.56% and 3.62% respectively, in brand I when compare to brand II. The higher values of protein content of breast fillet with skin, breast fillet without skin, drumsticks with skin, thigh cut skin on bone in and wings with skin in were 21.31±0.21, 23.34±0.09, 19.75±0.06, 15.45±0.10 and 18.32±0.15 respectively. The observations made out of the research indicate that the chemical composition of meat from whole chicken and various cuts differ significantly among the three different commercially available brands.*

***Key words*:** *Fat percent, mixed portions, pH, protein, water content, whole chicken.*

I. Introduction

Poultry meat and meat products are important source of high-value animal protein in human diets. Diet plays major role in human health. Meat fat contains of mostly monounsaturated and saturated fatty acids with oleic (C18:1), Palmitic (C16:0) and stearic acid (C18:0) being the most ubiquitous, however meat is a considerable source of cholesterol in the diet. Appropriate manipulation with broiler chicken diet could modify fatty acid profile in meat and increase its nutritional value (Valsta et al., 2005). The quality of meat and fatty acid profile both in breast and leg muscles mostly depend on components contained in feed mixture (Swierczewska et al., 2000). Poultry and pork meat contains more of poly unsaturated fatty acids (Valsta et al., 2005.).

The composition of poultry meat differs in different commercially available brands which are related to the feed offered, age of slaughter etc. Consumers prefer lean meat of reduced content of fat and high protein content. The objective of present study was to assess the composition of whole chicken and mixed portions of poultry in three different commercial brands available in market.

II. Materials And Methods

2.1. Sample collection

The experiment was conducted at central Laboratory of poultry Processing Plant-2, Saudi Arabia. Six samples from each portion (Tray packed) and whole chicken (Bag packed) of particular brand were collected from the outlets on the same day. Meat samples were taken for chemical analysis.

2.2. pH

pH was analyzed by calibrated FT-NIR(Bruker's).

2.3. Composition of meat

The Chemical composition of meat such as basic nutrients Protein, water content and fat determined by using standard methods (AOAC, 2000).

2.4. Statistical analysis

Data were evaluated statistically by the one-way analysis of variance using SPSS 17.0 software.

III. Results And Discussion

3.1. pH

The average pH values of whole chicken of three different brands were 5.59±0.09, 5.97±0.04 and 6.07±0.04, respectively as shown in Table 1 and Fig. 1. In case of drumsticks with skin, thigh cut skin on bone in and wings with skin in significantly higher pH values were found in brand III, 6.91±0.01, 5.96±0.03 and 5.94±0.15, respectively (Table 3 and fig.3). Whereas brand I showed significant higher pH value of 8.00 ±0.04 in breast fillet without skin and brand III showed significant higher pH value of 6.88±0.07 as per Table 2 and Fig. 2. Barbut (1997) reported that the color variations occur in the production of boneless and skinless breast raw meat. The difference in the muscle pH leads to extremes of light and dark breast fillets. Zhuang et al., (2013) found that method of scalding effects meat pH significantly.

3.2 Moisture content

Table 1 and Fig.1 showed the water content of whole chicken and mixed portions of chicken in three different brands. The higher moisture content of whole chicken, breast fillet without skin, wings with skin in and drumsticks with skin was observed in brand II, where as brand III showed significant higher water content in breast fillet with skin.

According to Boulianne and King (1995 and 1998) no differences in moisture content from pale or dark chicken breast meat, although the moisture content of light meat was significantly greater than the moisture content of normal and dark breast fillets. Further there were no significant correlations between pH and moisture content.

3.3 Protein content

The protein content of whole chicken is significantly higher in brand II, 18.06±0.13 ($P<0.05$) (Table 1 and Fig. 1). The protein content of mixed portions i.e. breast fillet with skin was significantly higher in brand III (21.31±0.21) and in breast fillet without skin, brand I showed significantly higher value of 23.34±0.09 (Table 2 and Fig. 2), where as incase of drumstick skin on bone in, thigh cut skin on bone in and wings skin on bone in, brand I showed significantly higher protein values, 19.75±0.06, 15.45±0.10 and 18.32±0.15 respectively (Table 3 and Fig. 3).

Barteczko et al., (2008), reported that broiler chicken fed with mixtures of higher protein content (23%) showed higher body weight and protein percent in muscle tissue compared to broilers fed with diet (20 & 19%) protein content. In the present study, the difference in the protein content of muscle tissue in various brands may be due to feeding of the diets formulated with different levels of protein content.

3.4 Fat percent

The fat percent of whole chicken were presented in Table 1 and Fig. 1. Brand I showed significant ($p<0.05$) higher fat percent in whole chicken, breast fillet with skin, Drumstick skin on bone in and wings skin on bone in with values of 22.30±0.91, 10.22±0.57, 6.89±0.03 and 13.36±0.46, respectively. The fat percent of breast fillet without skin were observed to be 0.02±0.00, 0.02±0.0 and 0.29±0.01, respectively in three different brands with significant higher value in brand III (Table 2). The fat percent of wings skin on bone in of three brands were 13.36±0.46, 12.16±0.23 and 13.41±0.32, respectively with significant lower fat percent found in brand II (Table 3).

Valsta et al., (2005) reported that appropriate manipulation with broiler chicken diet could modify fatty acid profile in meat and increase its nutritional value. Swierczewska et al., (2000) assume that the quality of meat and mainly fatty acid profile both in breast and leg muscles mostly depends on components contained in mixtures. Chemical composition of breast meat depended on type of the diet. Castellini et al., (2012) found that the organic chickens had carcasses with a higher breast and drumstick percentages and lower abdominal fat levels. The results of present investigation shows that fat contribution to breast muscle was dependent on level of oil added to the diet, which agrees with the observations of Osek et al., (2002) the research findings of Hanezakowski et al., (2001) the crude protein and its amino acid content, as well as unsaturated fatty acid profile in fat could influence a cholesterol balance.

IV. Figures and Tables

Table1: Chemical composition of whole chicken of different brands

Component	Brand-I	Brand-II	Brand-III
pH	5.59±0.09[b]	5.97±0.04[a]	6.07±0.04[a]
Moisture	56.78±1.04[b]	67.36±0.38[a]	65.59±0.33[a]
protein	16.87±0.07[b]	18.06±0.13[a]	16.70±0.11[b]
fat	22.30±0.91[a]	13.74±0.18[c]	17.40±0.23[b]

Each value is average of 6 observations

Mean values bearing different superscripts in a row differ significantly ($P<0.05$).

Table 2: Chemical composition of Breast fillet –comparison

Component	Breast Fillet			Breast fillet with skin		
	Brand-I	Brand-II	Brand-III	Brand-I	Brand-II	Brand-III
pH	8.00±0.04[a]	7.94±0.01[a]	7.58±0.01[b]	5.73±0.07[c]	6.21±0.07[b]	6.88±0.07[a]
Moisture (%)	86.83±0.13[b]	87.42±0.05[a]	85.07±0.04[c]	56.08±0.93[c]	76.59±0.32[b]	79.87±0.27[a]
Protein (%)	23.34±0.09[a]	23.07±0.06[b]	22.83±0.06[c]	16.78±0.26[c]	20.35±0.27[b]	21.31±0.21[a]
Fat (%)	0.02±0.00[b]	0.02±0.00[b]	0.29±0.01[a]	10.22±0.57[a]	6.60±0.16[b]	2.92±0.11[c]

Each value is average of 6 observations
Mean values bearing different superscripts in a row differ significantly (P<0.05).

Table 3: Chemical composition of the Skin on bone In portions

Portions	Brands	pH	Moisture (%)	Protein (%)	Fat (%)
Thigh Cut	I	5.77±0.02[b]	60.27±0.08[a]	15.45±0.10[a]	23.09±0.12[c]
	II	5.81±0.03[b]	56.12±0.67[c]	13.10±0.22[c]	27.49±0.30[a]
	III	5.96±0.03[a]	58.10±0.38[b]	13.65±0.08[b]	26.49±0.30[b]
Wings	I	5.87±0.09	68.57±0.52	18.32±0.15[a]	13.36±0.46[a]
	II	5.89±0.12	69.64±0.24	17.63±0.07[b]	12.16±0.23[b]
	III	5.94±0.15	69.06±0.23	16.57±0.09[c]	13.41±0.32[a]
Drumsticks	I	6.37±0.03[c]	75.19±0.09[b]	19.75±0.06[a]	6.89±0.03[a]
	II	6.62±0.02[b]	78.16±0.31[a]	19.12±0.07[b]	5.67±0.02[c]
	III	6.91±0.01[a]	78.56±0.07[a]	18.98±0.18[b]	6.55±0.01[b]

Each value is average of 6 observations
Mean values bearing different superscripts in a row differ significantly (P<0.05).

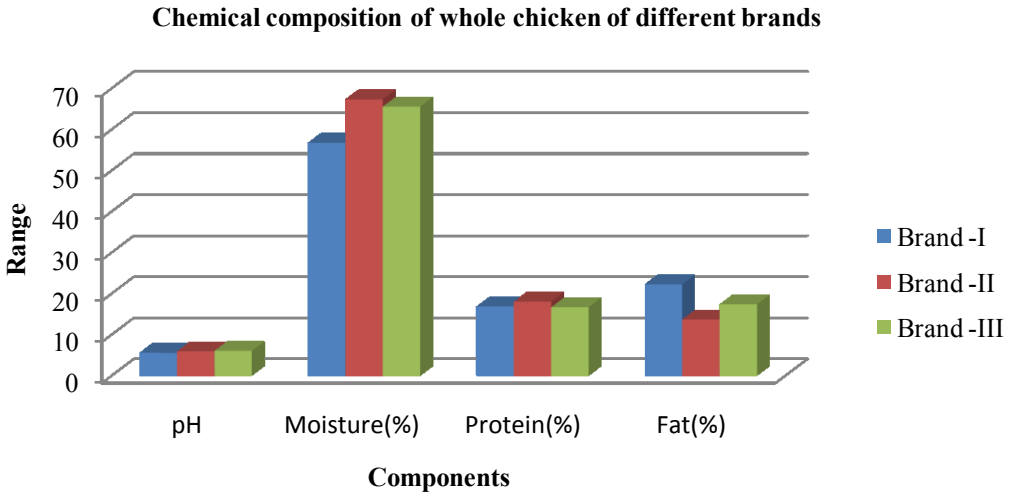

Fig. 1: Chemical composition of whole chicken (broiler) of different brands

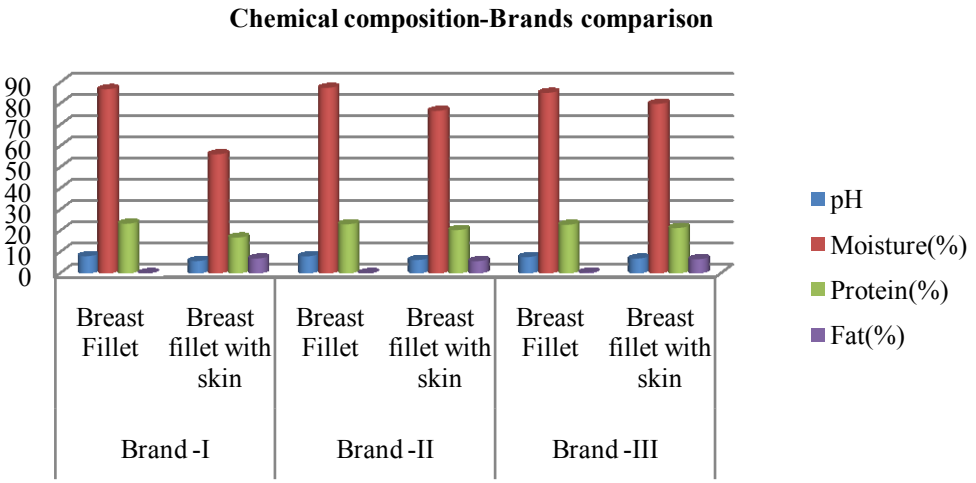

Fig. 2: Breast fillet chemical composition and comparison with and without skin of different brands

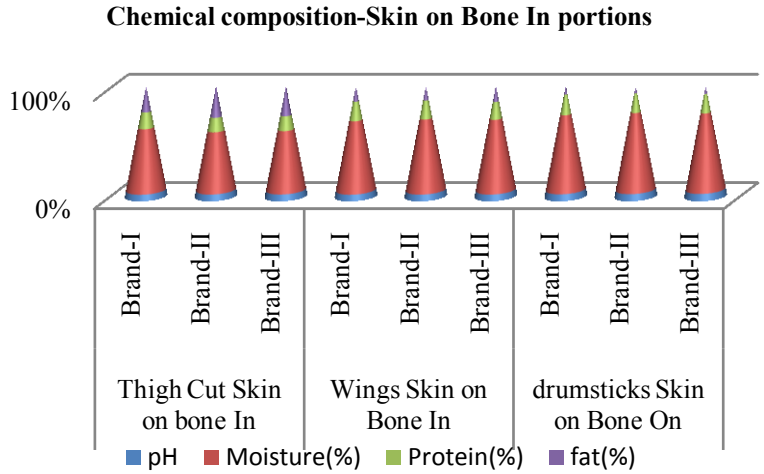

Fig. 3: Mixed portions of "Skin On bone In" of different brands

V. Conclusion

The results of above indicate that there exists wide difference in chemical composition of meat in different commercially available brands in the market. There is much variation in the fat content in different brands. The mixed portions with skin showed significant higher fat content, when compared to skin less portions. It is utmost important to screen the brands and alert the customers for usage of whole chicken and mixed portions in their health point of view, even though its unsaturated fat is not harmful.

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