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Meat Quality of Broilers Fed Discarded Cashew Nut Meal in Place of Soyabean Meal

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Abstract: This study examined the meat quality of broilers fed Discarded Cashew Nut Meal (DCNM) in place of Soya Bean Meal (SBM). It evaluates the meat quality of broiler chickens fed diets in which (SBM) was replaced with DCNM using sensory characteristics (appearance and taste) and oxidative stability of refrigerated meat as response criteria. The moisture contents obtained averaging 73.1±1.8, 73.1±1.5 and 72.3±1.6 g^{-1} 100 g for thigh, drumstick and breast, respectively. The lipid contents also were within the range of 4 and 12%. These results supported the findings of Ikeme that fat deposition in poultry increased from breast to organs, higher in back and highest in the thigh. However, the lipid contents of meat from broilers fed diets which contained DCNM at more than 10% (Diets 3-6) were generally significantly higher than those from meat of broilers on the control diet. This shows that the higher the level of DCNM in a diet, the more the fat content of meat from birds fed such diet. It was discovered that the overall acceptability of the broiler meat was not adversely affected by the dietary treatments irrespective of the level of DCNM inclusion. The study concludes that Anti-oxidants may be added to diets in which DCNM is included to extending shelf life of the meat through reduction in its susceptibility to lipid oxidation.

Key words: DCNM, broiler, oxidative, SBM, soyabean, Nigeria

INTRODUCTION

Poultry meat hs a wide acceptance with little or no limitation in terms of tradition and religious taboos as compared to pork which is rejected by muslims (Afolami and Oladimeji, 2003). A poultry carcass should produce a high yield of meat of good nutritional value and eating quality. On the other hand, as a commodity, it has to meet the market requirements of the customer in terms of an attractive colour and appearances of the product offered (Jerzy, 1990). Interest has been shown in the development of poultry industry in Nigeria because of the growing awareness of the nutritive value of poultry products, particularly meat. Chicken breast muscle contained lower lipid (Onibi, 2000) and myoglobin (Igene *et al.*, 1985) contents than the thigh muscle. Muscle tissue quality adversely affected by lipid oxidation includes taste, colour, flavour and water holding capacity (Onibi, 2001). Broiler chickens are fast growing strains of birds that are specifically produced for their meat. The meat is tender, soft, pliable and smooth textured (Onibi, 2000).

Mulder (1995) observed that the extent of replacing conventional with unconventional feed raw materials deserves economic consideration to avoid negative effect on consumer's preference for the quality of the finished products. He further stated that consumer's preferences are determined by the structure, the flavour and appearance of the meat and relatively low retail prices of the finished poultry products. According to Ikeme (1990), poultry meat varies in acceptability to consumers according to the tenderness, juiciness and flavour of the meat when cooked. Imevbore and Ademosun (1988) showed that broiler meat has 56.1 and 32.5% Unsaturated Fatty Acids (UFA) and saturated fatty acids, respectively. Thus, poultry meat may be susceptible to lipid deterioration due its high UFA content.

This study was designed to investigate consumer's preference (as judged by sensory panelists) for cooked meat samples and the extent of oxidation, during cold storage, of fresh muscle from broiler-chickens fed various levels of Discarded Cashew Nut Meal (DCNM) protein in place of Soyabean Meal (SBM) protein.

MATERIALS AND METHODS

The experimental diets were prepared at the Nutrition Laboratory of the Department of Animal Production and Health, Federal University of Technology, Akure. The

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Table 1: Composition of experimental diets (g^{-1}100 g)

	Diets					
	1	2	3	4	5	6
	% Soyabean meal replaced with discarded cashew nut meal protein					
Ingredients	0	10	20	30	40	50
Maize offal	14.0	14.0	14.0	14.0	14.0	14.0
Maize	43.65	40.0	36.6	32.8	28.6	24.5
GNC	1.0	1.55	1.85	2.45	3.55	4.35
SBM	25.0	22.5	20.0	17.5	15.0	12.5
DCNM	-	5.6	11.2	16.9	22.5	28.3
FM	2.0	2.0	2.0	2.0	2.0	2.0
BDG	5.0	5.0	5.0	5.0	5.0	5.0
Rice bran	5.0	5.0	5.0	5.0	5.0	5.0
Bone meal	2.5	2.5	2.5	2.5	2.5	2.5
Oyster	1.0	1.0	1.0	1.0	1.0	1.0
Premix*	0.2	0.2	0.2	0.2	0.2	0.2
Methionine	0.15	0.15	0.15	0.15	0.15	0.15
Salt	0.5	0.5	0.5	0.5	0.5	0.5
Total	100.00	100.00	100.00	100.00	100.00	100.00
Calculated						
Crude protein (gkg^{-1})	20.0	20.0	20.0	20.0	20.0	20.0
ME (MJ kg^{-1})	12	12	12	12	12	12

* Broiler finisher premix per 1 kg in the composition of the diet composed of the following: Vit.A (500,000 IU), Vit.D_3 (1000,000 IU), Vit.E (1,400 IU), Vit.K (0.8 g), Thiamine B_1 (0.8 g), Riboflavin B_2 (2 g), Niacin B_3 (16 g), D-calpan B_5 (4.4 g), Pyridoxine B_6 (1.6 g), Biotin (0.04 g), Folic acid (0.6 g), Vit.B_{12} (0.006g), Manganese (28 g), Zinc (20 g), Copper (2.4 g), Iron (16 g), Iodine (0.4 g), Cobalt (0.1 g), Selenium (0.06 g), Choline chloride (200 g), BHT (50 g) per kg. GNC = Groundnut Cake SBM = Soyabean Meal, DCNM = Discarded Cashew Nut Meal FM = Fish Meal, BDG = Brewers' Dried Grain, ME = Metabolisable Energy, BHT = Buthylated Hydroxy Toluene

study involved the use of six as shown in Table 1. The proximate compositions of the diets were determined by the method of AOAC (1995). Six isocaloric and isonitrogenous diets were formulated with Diet 1 (control diet) having 25% Soyabean Meal (SBM) inclusion as the main source of plant protein. Diets 2,3,4,5 and 6 had the SBM replaced with Discarded Cashew Nut Meal (DCNM) on equi-protein basis at 10,20,30,40 and 50% levels, respectively. Thus, diets 2, 3, 4, 5 and 6 had 5.6, 11.2, 16.9, 22.5 and 28.3 g^{-1} 100 g discarded cashew nut meal. The design of the experiment was Completely Randomized Design. The diets were fed to the growing broiler-chickens aged 35 days in their respective metabolism cages for 21 days.

After the close of the feeding trial, two male chickens per replicate were sacrificed and dissected. Each of the chickens was severed on the neck with sharp knife and defeathered. The breast muscles, drumsticks and thighs of the slaughtered birds were separated as described by Hahn and Spindler (2002). Samples for sensory evaluation were taken from the left side of each chicken while those for oxidative study were collected from the right side. Meat samples for sensory evaluation were refrigerated (at 4°C) overnight prior to preparation for the assessment. Muscles for oxidative studies were dissected and refrigerated for 12 h before preparation for cold storage treatment. The refrigerator was supported with a stand-by electric power generator.

Preparation and evaluation of meat samples for sensory quality: The meat samples (400-500 g) were packed into aluminum cooking pots (according to dietary treatments and muscle types) which contained 150 mL of 0.01% salt solution. Two cooking pots and two kerosene stoves of equal sizes were used in cooking the meat samples to reduce variation in the cooking conditions. Each set of meat samples was cooked for 30 min. after which they were removed and sliced into small pieces to make up the taste samples for each group.

The meat samples were randomly coded with 3-digit numbers unknown to the panelists to prevent bias judgement, arranged circularly on plate and served to each of the 10-member panelists (5 males and 5 females) to evaluate for appearance and taste, using a 9-point Hedonic scale as described by Larmond (1982).

Sample Preparation and assay for oxidative stability: Each deboned muscle from breast, drumstick and thigh from each chicken were cut into 3 parts after the 12 h aging period. One part was frozen immediately (day 1 refrigeration) and the remaining 2 parts were refrigerated at 4°C for 3 and 6 days prior to frozen storage (days 3 and 6 refrigeration, respectively). On the day of analysis, the frozen muscles from chickens on the same dietary treatment were pooled together, chopped into small pieces according to muscle type, homogenized, filtered and assayed for Thiobarbituric Acid Reactive Substances (TBARS) as described by Pikul *et al.* (1989).

Ten grams from each thoroughly mixed sample was put in 100 mL measuring cylinder. 34 mL of 4% perchloric acid solution was added to each sample followed by the addition of 1 mL of 0.1% BHT solution in ethanol. The sample was homogenized at 4000 rpm for 1 minute using a Ystral GmbH D-7801 homogeniser (Dottingen type X1020). It was later washed with little water. The homogenized sample was filtered through Whatman No. 1 filter paper into a 50 mL buckner flask using pressure filter pump and washed with 5 mL of distilled water. The filterate was transferred into a 50 mL volumetric flask and made up to 50 mL mark by adding 4% perchloric acid solution.

The filtrate was mixed thoroughly, transferred into storage bottles and kept in a freezer. This was followed by TBA assay which was carried out within 2 days of extraction.

On the day of assay, the frozen sample filtrate was allowed to thaw at room temperature for 1 h. 5 mL aliquot of the filterate was transferred into screw-capped tube and mixed with 5 mL of 0.02M TBA solution. The tubes were covered and mixed thoroughly using vortex mixer. The tubes were then incubated in boiling water for 30 min. After incubation, the racks containing tubes were cooled under tap water for 10 min. The absorbance of the coloured complex formed was determined at 532 nm against a blank containing 5mL of 4% perchloric acid solution and 5 mL of 0.02M TBA solution, using Gallenkamp Spectronic 20.

Determination of Moisture and Lipid Contents of fresh meat samples: Part of the fresh sample (from day 1 of refrigeration) for oxidative study was used for determination of moisture and lipid contents of muscle tissues.

Lipid content was determined using Soxhlet extractor and petroleum ether as the solvent as described by Davis (1978).

Dried samples of chopped thighs, drumstick and breast muscle (obtained from moisture content determination) were finely ground using mortar and pestle. They were put in previously weighed filter paper (W_1) and the paper with 1g of each of the ground samples was Weighed (W_2). The study and the samples were neatly folded and tied using thread and then transferred into the apparatus thimble. 500 mL round bottom flask of the apparatus was ¾ filled with petroleum ether. The extractor was fitted with the reflux condenser. Heating was done to allow the solvent boil and reflux several times within 4 h. The samples were thereafter removed, dried in oven for 1 h, cooled in dessicator and Weighed (W_3).

Statistical analysis: All data were subjected to 6×3 factorial analysis of variance (6 diets×3 muscle types) using the Minitab Statistical Package (v.10.2, Minitab Inc. P.A., USA). Figures were drawn using Microsoft Excel (v.2000, Microsoft Corp. W.A., USA).

RESULTS

Moisture and lipid contents of the meat: The percentage of moisture and lipid content of meat from broiler-chickens fed equi-protein replacement of SBM with DCNM is presented in Table 2. There was no significant difference ($p>0.05$) in the moisture content in respect of the dietary treatment, muscle type and in the interactive effect of the diets and the muscle types. The moisture content ranged between 71.5±1.5 and 74.3±2.1 g^{-1} 100 g for thigh muscle; 71.1±1.6 and 73.8±1.7 g^{-1} 100 g for breast muscle and 71.8 ±0.8 and 73.9±1.7 g^{-1} 100 g for drumstick muscles. Moisture content of muscles from birds fed diet 4 (30%

Table 2: Moisture and lipid contents (g^{-1}100g) of meat from broiler-chickens fed Equi-protein replacement of Soyabean meal (SBM) with Discarded Cashew Nut Meal (DCNM)

DIET	%SBM replaced with DCNM	Muscle type	Moisture	Lipid
1	0	Thigh	74.3+2.1	10.3+0.4
2		Drumstick	73.2+1.3	8.5+0.5
		Breast	72.3+2.0	7.5+0.8
3	10	Thigh	72.7+1.2	10.5+1.4
		Drumstick	73.0+1.0	8.4+0.6
		Breast	73.4+1.6	7.0+0.8
	20	Thigh	72.3+2.4	12.7+1.6
		Drumstick	73.9+1.7	10.9+0.9
4		Breast	71.8+1.6	7.6+0.5
	30	Thigh	71.5+1.5	12.3+1.4
		Drumstick	71.8+0.8	12.0+1.1
5		Breast	71.9+1.2	8.3+0.7
	40	Thigh	73.7+1.6	13.8+0.7
		Drumstick	73.7+2.2	12.0+0.5
6		Breast	73.8+1.7	9.9+0.9
	50	Thigh	73.6+1.5	13.2+0.3
		Drumstick	72.7+1.2	12.8+1.0
		Breast	71.1+1.6	10.1+0.9
Statistical significance				
Diet			NS	***
Muscle Type			NS	***
Diet×Muscle Type			NS	NS

Mean+SD n = 3 NS = Not significant ($p>0.05$) *** = $p<0.001$

Mean Comparism of treatment effects

Dietary effect	Moisture	Lipid
1	73.3±1.8	8.8 ± 1.3^{ab}
2	73.0±1.2	8.6 ± 1.7^{a}
3	72.7±1.9	10.4 ± 2.4^{bc}
4	71.8±1.0	10.8 ± 2.2^{c}
5	73.7±1.6	11.9 ± 1.8^{c}
6	72.5±1.7	12.0 ± 1.6^{c}
Muscle type effect		
Thigh	73.1±1.8	12.1 ± 1.7^{c}
Drumstick	73.1±1.5	10.8 ± 1.9^{b}
Breast	72.3±1.6	8.4 ± 1.4^{a}

Mean±SD, Means with different superscripts within the same column and for the same parameter are significantly different ($p = 0.05$)

DCNM inclusion) had the lowest average of 71.8±1.0 g^{-1}100 g while it was highest from birds fed diet 5 (40% DCNM inclusion) averaging 73.7±1.6 g^{-1} 100 g (p>0.05).

There were significant differences (p = 0.001) in lipid contents of the meat due to diet and muscle types. However, the interaction between diet and muscle type produced no significant difference (p>0.05). The lipid content ranged between 10.3±0.4 and 13.8±0.7 g^{-1} 100 g for thigh muscle; 8.4±0.6 and 12.8±1.0 g^{-1} 100 g for drumstick muscle and 7.0±0.8 and 10.0±0.9 g^{-1} 100 g for breast muscle. The lipid contents was higher in the muscles of broilers fed diet 6 (12.0±1.6 g^{-1} 100 g) and lowest for those on diet 2 (8.6±1.7 g^{-1}100 g) (p = 0.05).

The thigh muscle had the highest muscle lipid content (12.0±1.7 g^{-1} 100 g), followed by the drumstick (10.8±1.9 g^{-1} 100 g) and lowest for breast (8.4±1.4 g^{-1} 100 g) (p = 0.05).

Organoleptic characteristics of the meat: Results of the organoleptic characteristics of the meat samples are presented in Table 3. The appearance and taste of the cooked meat samples were not significantly (p>0.05) influenced by the dietary treatments, muscle type and the interaction of these two factors. Appearance score of the cooked meat was highest for muscle from birds fed diet 4 (30% DCM inclusion) being 7.2±1.3 while the lowest was from the muscle from birds fed diets 2 and 5 (10 and 40% DCM inclusion respectively) being 6.8±1.2 each. The breast muscles had the highest score of 7.3±1.1 while the drumstick had the lowest of 6.6±1.4. Muscle from birds on diets 2, 3 and 4 (i.e. 10, 20 and 30% DCM inclusion, respectively) had the lowest taste scores of 6.7±1.4, 6.7±1.2 and 6.7±1.3 respectively while those on diet 6 (50% DCM inclusion) had the highest taste score of 7.3±1.3. However, drumstick had higher taste score of 7.1±1.5 than thigh and breast that had 6.8±1.4 and 6.8±1.1, respectively.

Oxidative stability of the meat: Table 4 shows the results of the extent of oxidation measured as the concentration of Malonaldehyde (MDA) in meat during refrigerated storage. There were significant differences (p = 0.001) due

Table 3: Organoleptic characteristics of cooked meat from broiler-chickens fed equi-protein replacement of Soyabean Meal (SBM) with Discarded Cashew Nut Meal (DCNM)

Diet	%SBM replaced with DCNM	Muscle type	Appearance	Taste
1	0	Thigh	7.1±1.1	6.6±1.5
		Drumstick	6.6±1.5	6.9±1.5
2		Breast	7.0± 1.1	6.9±1.3
	10	Thigh	6.9±0.6	6.6±1.3
		Drumstick	6.4±1.8	6.8±2.0
3		Breast	7.0±0.9	6.6±1.1
	20	Thigh	6.8±1.2	6.6±1.4
		Drumstick	6.9±1.5	7.0±1.3
4		Breast	7.6±0.9	6.4±0.7
	30	Thigh	7.5±1.2	6.9±0.4
		Drumstick	6.9±1.6	6.6±2.0
5		Breast	7.3±1.4	6.6±1.1
	40	Thigh	6.3±1.6	7.0±1.7
		Drumstick	6.5±1.1	7.4±1.3
6		Breast	7.5±0.5	6.8±1.7
	50	Thigh	7.3±0.9	7.0±1.9
		Drumstick	6.3±1.4	7.8±1.0
		Breast	7.3±1.4	7.1±0.6
Statistical significance				
Diet			NS	NS
Muscle Type			NS	NS
Diet x Muscle Type			NS	NS

Mean±SD = n = 10, NS = Not significance (p>0.05)
Mean Comparism of treatment effects

Dietary effect	Appearance	Taste
1	6.9±1.2	6.8±1.4
2	6.8±1.2	6.7±1.4
3	7.1±1.2	6.7±1.2
4	7.2±1.3	6.7±1.3
5	6.8±1.2	7.0±1.5
6	6.9±1.3	7.3±1.3
Muscle type effect		
Thigh	7.0±1.2	6.8±1.4
Drumstick	6.6±1.4	7.1±1.5
Breast	7.3±1.1	6.8±1.1

Mean±SD

Table 4: Oxidative stability (mg MDA^{-1}/kg muscle) of refrigerated meat from broiler-chickens fed equi-protein replacement of Soyabean Meal (SBM) with Discarded Cashew Meal (DCNM)

Diet	% SBM replaced with DCNM	Muscle type	Storage length at 4°C (Days) 1	3	6	Statistical significance
1	0	Thigh	0.85±0.01^a	0.92±0.03^b	1.79±0.05^c	***
		Drumstick	0.83±0.01^a	0.85±0.02^a	1.64±0.04^b	***
		Breast	0.70±0.05^a	0.74±0.04^a	1.40±0.07^b	***
2	10	Thigh	0.88±0.03^a	1.00±0.02^a	1.72±0.16^b	***
		Drumstick	0.81±0.05^a	0.90±0.07^a	1.31±0.06^b	***
		Breast	0.78±0.03^a	0.80±0.08^a	1.29±0.04^b	***
3	20	Thigh	1.00±0.11^a	1.07±0.06^a	1.76±0.07^b	***
		Drumstick	0.85±0.07^a	0.91±0.09^a	1.43±0.22^b	**
		Breast	0.70±0.07^a	0.86±0.05^a	1.26±0.14^b	***
4	30	Thigh	1.13±0.07^a	1.13±0.14^a	1.60±0.06^b	***
		Drumstick	0.91±0.08^a	1.01±0.10^a	1.42±0.03^b	***
		Breast	0.90±0.01^a	0.92±0.04^a	1.28±0.07^b	***
5	40	Thigh	0.94±0.10^a	1.01±0.05^a	1.71±0.14^b	***
		Drumstick	0.91±0.06^a	1.00±0.09^a	1.40±0.03^b	***
		Breast	0.82±0.05^a	0.86±0.05^a	1.33±0.03^b	***
6	50	Thigh	1.10±0.05^a	1.11±0.07^a	1.70±0.10^b	***
		Drumstick	1.00±0.07^a	1.08±0.11^a	1.48±0.14^b	**
		Breast	0.82±0.10^a	0.87±0.12^a	1.22±0.12^b	**

Statistical significance			
Diet	***	***	**
Muscle Type	***	***	***
Diet x muscle type	NS	NS	NS
Meat±SD	n = 3	** = p<0.01	*** = p<0.001

NS = Not significant (p>0.05)

Means with different superscripts within the same row are significantly (p<0.05) different

Mean Comparison of treatment effects

	1	3	6
Dietary effect			
1	0.79±0.08^a	0.83±0.08^a	1.61±0.18^b
2	0.82±0.05^a	0.88±0.09^{ab}	1.44±0.23^a
3	0.84±0.15^a	0.95±0.11^{bc}	1.48±0.26^{ab}
4	0.97±0.12^b	1.02±0.13^c	1.43±0.15^a
5	0.88±0.08^b	0.96±0.09^{bc}	1.48±0.19^{ab}
6	0.96±0.13^b	1.02±0.15^c	1.46±0.23^{ab}
Muscle type effect			
Thigh	0.97±0.12^c	1.04±0.10^c	1.71±0.11^c
Drumstick	0.88±0.08^b	0.95±0.11^b	1.44±0.09^b
Breast	0.78±0.09^a	0.84±0.08^a	1.30±0.14^a

Mean±SD, Means with different superscripts within the same column and for the same parameter are significantly different ($p \leq 0.05$)

to the diets and muscle type on the MDA concentration at days 1, 3 and 6 of refrigerated storage. Interactive effect of the diets and muscle type was not significant (p>0.05) on all the days (1, 3 and 6). It was observed that MDA concentration in the meat significantly (p<0.01 and p<0.001) increased with the increasing storage length in all the muscles irrespective of the dietary treatment.

DISCUSSION

The moisture contents obtained in this study averaging 73.1±1.8, 73.1±1.5 and 72.3±1.6 g^{-1} 100 g for thigh, drumstick and breast respectively are within the range of 65 to 76% reported for poultry by Adrian *et al.* (1982); Ikeme (1990). The lipid contents also were within the range of 4 and 12% reported for poultry by Ikeme (1990). The result obtained supported the findings of Ikeme (1990) that fat deposition in poultry increased from breast to organs, higher in back and highest in the thigh. The significant effect of diets and muscle type on lipid contents of the meat was in agreement with the report of Ikeme (1990) that fat content of meat varies with diets and the different muscles in the same bird. However, the lipid contents of meat from broilers fed diets which contained DCNM at more than 10% (Diets 3-6) were generally significantly higher than those from meat of broilers on the control diet. Meat from broilers fed diet 2 (10% DCNM inclusion) had lower lipid content than the control. This shows that the higher the level of DCNM in a diet, the more the fat content of meat from birds fed such diet. The increasing level of lipid in the meat with increase in the level of DCNM in the diet may be attributed to the high lipid contents of DCNM. Lipid contents is the most variable components of meat and there are variations in the amount of lipid deposited in different parts of poultry (Olomu, 1995; Aduku and Olukosi, 2000).

The lipid contents of thigh muscle in this study were higher than those of drumsticks and breast muscles. This supports the report of Ikeme (1990) that inner thigh muscles have numerous fat globules than the drumstick and breast muscles. Onibi (2000) also reported similar results with thigh having higher lipid than drumsticks and breast muscles.

There was no significant influence of the diet, muscle type and their interaction on the appearance and taste of the cooked meat and this shows that the muscle types from chickens fed the different diets had similar taste and appearance. The similar taste indicates that fat content which was higher in thigh muscles contributed little to taste or mouth satisfaction of the meat similar to the report of Keniac (1961). However, meat from chickens fed diet 6 (50% DCNM inclusion) had higher taste score than diet 1 (0% DCNM inclusion) which may be attributed to higher lipid content and hence higher juiciness of the meat.

With regard to the oxidative stability of the products, it was observed that there was an increase in the MDA concentration with a corresponding increase in length of storage irrespective of muscle type. This supports the earlier report of Monahan *et al.* (1972); Pikul *et al.* (1989); Pikul and Kumerow (1990) and Onibi *et al.* (1998) which stated that deteriorative changes due to oxidation continue to occur during refrigerated storage of meat. The breast which contained the lowest lipid content had the lowest MDA concentration while the thigh which had the highest lipid content oxidized most for all the storage length (.0.78±0.09 vs 0.97±0.12 for day 1, 0.84±0.08 vs 1.04±0.10 for day 3 and 1.30±0.14 vs 1.71±0.11 mg MDA kg^{-1} muscle for day 6. This shows that thigh muscle was more susceptible to oxidation than breast muscle. The susceptibility of chicken parts to oxidation differed significantly from one another and it agrees with earlier studies (Lin *et al*., 1989; Monahan *et al*., 1992 and Pfalzgraf *et al*., 1995) that the higher the quantity of lipid in meat the higher the susceptibility of the meat to lipid oxidation. Diet 2 (10% DCNM inclusion) had the least MDA concentration value. MDA contents of muscle from the birds did not show any trend in relation to diet. Thus, at the level of DCNM inclusion studied, lipid content of the muscles increased with increasing DCNM but did not adversely affect the meat in term of oxidative susceptibility. Igene *et al.* (1985) Apte and Morrisey (1987) and Kanner *et al.* (1988) reported in their studies that free iron content from haeme pigment of muscle is an important catalyst of lipid oxidation which varies among species and between muscle in a bird, being higher in thigh muscle than drumstick and breast muscles and increases during refrigerated storage and cooking. This study thus shows that thigh muscles which have higher free iron content had higher rate of lipid oxidation than drumstick and breast.

CONCLUSION

The overall acceptability of the broiler meat was not adversely affected by the dietary treatments irrespective of the level of discarded cashew meal inclusion. Therefore, the meat quality of broiler fed discarded cashew nut meal would be widely accepted by the consumers without any undesirable taste being detected. As inclusion of discarded cashew nut meal in poultry diets increased, the lipid content of the meat from such diet increased but at the level of inclusion studied (up to 50% DCNM), susceptibility of the muscle to lipid oxidation was similar. However, it may be necessary to incorporate anti-oxidants, either synthetic or natural, to diets in which discarded cashew nut meal is included or directly to meat product from animals fed discarded cashew nut meal-based diets as this could improve meat quality by extending shelf life of the meat through reduction in its susceptibility to lipid oxidation. The higher lipid content of the meat with increasing level of DCNM should be taken into consideration so that such meat product would not pose any health threat to humans having cardiovascular problems when consumed.

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