ANIMAL BIOTECHNOLOGY

QUALITY ASSESSMENT OF CHICKEN FILLETS PRODUCED FROM BROILER CHICKENS FED NATURAL PIGMENT SOURCES

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ABSTRACT
The quality of chicken fillets obtained from broiler chickens fed diets containing natural pigment sources was investigated. One hundred and sixty one-day-old Abor acre broiler chicks were randomly allotted to 5 dietary treatments with 4 replicates and 8 birds per replicate in a completely randomised design. TA- Control, TB-Baobab leaves, TC-Moringa leaves, TD-Orange peels, TE-Roselle calyx. (all at 4% inclusion rates). Two birds per replicate were slaughtered at 8 weeks and breast muscle was harvested to develop chicken fillets which were stored and analysed on day 0, 3 and 6. Lipid oxidation rate, pH and Aerobic Plate Count (APC) were determined on stored fillets. The result revealed that pH values of fillets increased ($p<0.05$) over the storage days with treatments C and E having the highest values (6.22) at day 6. Lipid oxidation rate was also significant ($p<0.05$) for treatment effect only, with treatment C having the lowest values (2.88). Microbial contents of fillets in Treatment C reduced significantly at day 6 compared to fillets produced and stored from other treatments. However, APC for all treatments ($p<0.05$) varied slightly across the treatments and over the storage days. It can therefore be concluded that Moringa supplemented diet had better effects on maintaining the oxidative and microbial quality of the chicken fillets during the storage period.
Key words: quality, natural pigment, chicken fillets, shelf stability

INTRODUCTION
The production of meat birds especially broilers is on the increase due to increased demand for animal protein of poultry origin especially in Nigeria. The feed consumed by broilers has a direct impact on the physical properties of the meat produced (1). These properties include, but are not limited to, color and sensory properties (flavor, juiciness, tenderness) which influences consumers' decision to purchase the meat. Meat colour is important for both the consumer's initial selection of a raw meat product in the marketplace and for the final evaluation and ultimate acceptance (2). According to (3, 4), colour and uniformity of poultry skin and meat, and consistency of color, are important attributes by which consumers select poultry products, and how they assess the final quality of the product at consumption. Colour of poultry skin and meat is provided by carotenoid pigments present in the diet that are deposited in the meat, skin and subcutaneous fat. Carotenoids are a group of more than 500 pigments spread throughout the plant and animal kingdom (5). They include xanthophyll, beta-carotene, capsanthin, canthaxanthin, lutein etc. These pigments cannot be synthesized by poultry but can be transformed and metabolised, therefore, they must be obtained from the diet (6). Plant meals and extracts have also been found to have high antioxidant and antimicrobial capabilities which could be deposited in meat when included in the diets and this could help improve the shelf life of meat or the resultant meat products (7). This study was therefore carried out to determine the influence of *Moringa oleifera*, Roselle (*Hibiscus sabdariffa)*, Baobab (*Adansonia digitata*) and Orange peels as natural pigment sources on quality of broiler chicken fillets.

MATERIALS AND METHODS
The study was carried out at the Poultry unit of the Teaching and Research Farm and Animal Product and Processing Laboratory of the Department of Animal Science, University of Ibadan. One hundred and sixty one-day-old Abor acre broiler chicks were randomly allotted into five

dietary treatments with 4 replicates each and 8 birds per replicate in a completely randomized design. Leaves of Moringa, Baobab, Roselle calyx and orange peels were harvested fresh, air-dried, milled and thereafter included in the broiler finisher diet (from day 21) in an 8-week feeding trial. Treatment A was the control, while B to E had Baobab (Treatment B), Moringa (Treatment C), Orange peel (Treatment D) and Roselle calyx (Treatment E) at 4% inclusion rates respectively. At the end of the experiment, 2 birds per replicate were slaughtered and breast muscle harvested for chicken fillet development. Chicken breast were frozen, sliced and brined for 2hours before oven drying at 80^{o}C for 6 hours. Fillet samples produced from birds fed the different treatment diets were allowed to cool and thereafter stored at room temperature for 6days. Samples were obtained and evaluated at intervals of 0, 3 and 6 days during the storage period.

pH Determination: 1g of fillet sample was weighed and thoroughly homogenised with distilled water (1:10 w/v). The pH of samples was measured in triplicates by an Electrode probe pH meter.

Analysis of Lipid Oxidation: Thiobarbituric Acid-Reactive Substances (TBARS) assay was performed in triplicates according to the method described by (8)

Aerobic Plate Count Determination: Total plate count was determined as recommended by the American Public Health Associations for Foodstuff Examination (9).

Statistical Analysis: All data collected were subjected to the ANOVA using SAS, 1999; significant means were separated using Duncan Multiple Range Test of the same software.

RESULTS AND DISCUSSION

pH values of chicken fillets from broiler chickens fed natural pigment sources: pH values of chicken fillets (table 1) increased significantly ($p<0.05$) across treatments and during the storage period. Highest values were recorded for Treatments C and E (6.22) at day 6 while lowest value was obtained for Treatment D (5.96) at day 6. This result is not in agreement with results reported by (10) where dietary supplementation did not significantly affect the pH of broiler breast fillet.

Oxidative rancidity of chicken fillets obtained from broiler chickens fed natural pigment sources: The rate of oxidative rancidity of the prepared fillets was measured using the thiobarbituric acid reactive rate (TBARS) as stated in table 1. Effect of storage days had no significant effect on the rate of oxidative rancidity of the stored fillets; however there were significant treatment effects on the rate of oxidative rancidity of the fillets. Treatment C had lowest values (2.88) at day 6 which could be as a result of high antioxidant capabilities of Moringa which helped in maintaining the quality of the meat product. Similar results were reported by (11) in broiler chickens fed diets supplemented with Moringa leaf meal.

Aerobic plate count of chicken fillets obtained from broiler chickens fed natural pigment sources: The aerobic plate count of all treatments varied slightly but significantly among treatments and over the storage days. This shows that all the supplemented diets were able to play effective

Table 1: Effects of natural pigments and storage days on quality of chicken fillets

PARAMETERS	STORAGE DAYS	A	B	C	D	E
pH	**0**	6.08^{aj}	5.99^{bk}	6.05^{cjk}	6.01^{bjk}	6.15^{bi}
	3	6.08^{aj}	6.12^{aij}	6.16^{bi}	6.14^{aij}	6.16^{bi}
	6	6.11^{aj}	6.05^{bj}	6.22^{ai}	5.96^{bk}	6.22^{ai}
TBARS	**0**	4.44^{ai}	3.19^{bi}	3.56^{abi}	2.24^{ai}	3.78^{ai}
	3	2.84^{aj}	5.69^{ai}	5.70^{ai}	2.13^{aj}	4.65^{aij}
	6	2.76^{ai}	3.04^{ai}	2.88^{bi}	4.05^{ai}	3.47^{ai}
TPC	**0**	7.43^{ck}	7.36^{bl}	7.62^{bj}	7.87^{ai}	7.62^{bj}
	3	7.68^{bi}	7.32^{cl}	7.69^{ai}	7.53^{cj}	7.36^{ck}
	6	7.76^{aj}	8.02^{ai}	7.63^{bkl}	7.62^{bl}	7.65^{ak}

^{abc}Means along the same column with different superscripts are significantly different ($p<0.05$)

^{ijkl} Means along the same row with different superscripts are significantly different ($p<0.0005$)

A: CONTROL; B: BAOBAB; C: MORINGA; D: ORANGE PEELS; E: ROSELLE; TBARS: THIOBARBITURIC ACID REACTIVE SUBSTANCE; TPC: TOTAL PLATE COUNT

antimicrobial roles and maintain the microbial load of the chicken fillet at around the same range of values. However, Moringa was able to significantly reduce microbial load of the chicken fillets from 7.69 to 7.63 on day 6 of the study. The variations obtained in this result could be as a result of known antimicrobial potential of the test ingredients which have been reported to affect storage (12,13).

CONCLUSION

The use of natural pigment sources in diet of broiler chicken is to improve the colour of the meat, delay deterioration due to lipid oxidation and microbial growth. Diet supplemented with Moringa leaves was able to improve the quality of the chicken fillets in this study.

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