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Slaughter Performance, Meat Quality and Organoleptic Indices of Crossbred Progenies from Meat-Type Chicken and Nigerian Indigenous Chicken Breeds

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ABSTRACT

Background and Objective: The number of characteristics, most notably the sensory, physical and chemical characteristics of chicken carcasses and meat all of which are influenced by the genetic makeup of the birds can be used to evaluate the quality of poultry products. The quality of poultry products can be assessed by several attributes, primarily the sensory, physical and chemical attributes of chicken carcasses and meat, which vary with genetic composition of chickens. The aim is to investigate and compare the meat slaughtered performance meat quality and sensory assessments of the crossbred chickens from the broiler chickens and Nigerian Indigenous chickens with the best to present to consumers. **Materials and Methods:** The crossbred genetic component chickens used were produced from crosses between Arbor acre broiler chickens (male-AA) and Nigerian Indigenous chickens (female-FF frizzle feather, FE Fulani ecotype, NN-naked neck and NF-normal feather) and slaughter performance, meat quality and consumer sensory assessment were evaluated and data obtained were subjected to one-way Analysis of Variance (ANOVA) at $p<0.05$ significant level. **Results:** Data obtained on slaughter performance was better in genetic components of AANN of values 2950.80, 2935.90, 2612.60, 250.09, 480.02, 465.81, 300.09, 809.34 and 198.00 g for live weight, slaughtered weight, dressed weight, wing weight, thigh weight, drumstick weight, back weight and breast weight, respectively. The meat quality favored AANN chickens for lowest pH and lightness toward white for breast and thigh meat samples while sensory indices were much enhanced in terms of colour (5.63), flavor (7.85), juiciness (6.25) and acceptability (7.90) in the genetic components of AANN than other genetic stocks involved. **Conclusion:** Variations exist for slaughter performance, meat quality and sensory assessment due to genetic constitution of the chickens involved and combining effect of AANN proved much better in terms of parameters measured than AAFF, AAFE and AANF counterparts.

KEYWORDS

Slaughter performance, meat quality, sensory assessment, broiler, Nigerian Indigenous chickens

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INTRODUCTION

Nigerian Indigenous chicken meat is highly valued for its nutritious qualities and affordable price, making it a popular local animal protein source. The local strains of chicken have lower fat and cholesterol content been reported by Jaturasitha *et al.*[1], while eggs and meat are regarded as excellent providers of iron and protein[2]. Nigerian Indigenous chicken meat is one of the most commonly used local animal protein sources because of its nutritional value and relatively reasonable prices in Nigeria. The native chicken strains have lower contents of fat and cholesterol has been reported by Jaturasitha *et al.*[1], while the meat and eggs are considered rich sources of protein and iron[2]. Due to genetic selection, better nutrition and routine veterinary care, broiler chickens, on the other hand, have large meat outputs, excellent growth performance and early market weight. But the meat's functional and sensory properties might have suffered as a result of selection for quick growth[3]. Consumers now demand naturally produced goods that are high in nutrients, free of chemical pollutants and have high-quality meat. Native chickens are often raised without the use of chemicals or antibiotics, ensuring their safety and having no detrimental effects on human health[4].

Although there is a limited market for Nigerian Indigenous chickens, there is a growing consumer demand for them. In recent years, there has been a shift in consumer preferences toward higher-quality, less labor-intensive items. On the other hand, crossbred genotypes derived from native Nigerian breeds can be the primary factor in high-quality output and help preserve genes. Meat quality refers to all the physical, chemical and biological properties, formed after the slaughtering[5]. A number of characteristics can be used to evaluate the quality of poultry meats, but the main ones are the physical (muscle yield, water-holding capacity, cooking loss) and sensory (color, tenderness, flavor and juiciness) characteristics of chicken carcasses and meat, which change depending on growth rate and body composition[6]. Determining customer preferences with regard to meat quality particularly color is a challenging task depending on the area, culture and mindset of the individual[7].

Experiments were carried out by a number of researchers in order to enhance growth performance and selection for body weight for broiler chickens[2,8-10]. Additionally, some research was done to enhance carcass composition[11]. Their poor performance and low growth efficiency can be attributed to inadequate management; nutrition, hygienic practices and most importantly breed[12]. Farmers generally raise them in free range with any feed at hand and without breed selection leading to inbreeding[1].

Crossbreeding can be done via back crossings, rotating crosses, two-, three-, or four-line crosses. In order to combine a local breed's environmental adaptation with an upgraded alien breed's higher production potential, crossbreeding often entails a two-line cross between the two[13]. In order to help farmers', produce chicken meat profitably, Nigerian Indigenous chickens were mated with broilers to create crossbred chickens and this was a novel idea that researchers can present to poultry farmers around this environment. The present study aims to investigate and compare the meat slaughtered performance and quality traits of Nigerian Indigenous chicken as well as their crossbreds from the broiler chickens.

MATERIALS AND METHODS

Site of experiment: The study was carried out at the Emmanuel Alayande University of Education's Animal Breeding and Genetics Unit of Teaching and Research Farm and Home Economics Food Laboratory in Oyo, Oyo State, Nigeria. Oyo is located at Latitudes 7°5' Northeastward from Ibadan, the capital of Oyo State and Longitude 3°5' East of the Greenwich meridian. There are 300 to 600 m above sea level at this altitude. The average yearly rainfall and temperature are 1,165 mm and 27°C, respectively. The region is covered with Nigeria's Southern Guinea Savanna vegetation. The experiment lasted between October, 2023 to January, 2024.

Experimental birds and management: For the experiment, a total of sixty adult birds were used; these included twenty-four Arbor acre sires and twenty each of normal feather, frizzled feather, naked neck and Fulani ecotype chickens' dams. For each genotype, there were six cocks and twenty-four hens distributed. The Nigerian native birds were obtained from the pre-existing chickens at the Breeding and Genetics Unit of the Poultry division of the Teaching and Research Farm of Emmanuel Alayande University of Education, Oyo, while the Arbor acre broiler chicken sires were purchased from a respectable breeder farm in Ibadan, Nigeria. The experimental birds were closely supervised using an intense management system. The hens and cocks were 18-24 weeks old and 18 weeks old, respectively. Each bird's wing was individually tagged to facilitate identification. The chickens were individually marked and housed in an open-sided poultry house with a two-tiered 1800 square inch galvanized batter cage. Every bird was kept in a cage measuring 15 by 7.5 inches. The necessary vaccinations and medications were administered.

Feed and feeding of parent stock: Commercial breeder's grower mash, with 16% crude protein and 2600 kcal/kg metabolizable energy, was fed to the cocks on an *ad libitum* basis. Additionally, commercial layers mashed with 16% crude protein and 2800 kcal/kg metabolizable energy were given to the hens. While *ad libitum* supplies of cool and clean water were also provided.

Experimental mating: The chickens were mated using the Artificial Insemination (AI) technique. The cocks were trained for 2 weeks to collect semen by pressing at the back towards the tail forty times prior to sperm production. The cocks were then subjected to the massage technique. The cock's vent feathers were clipped every 2 weeks and at 22 weeks of age, the cock began to gather semen. The semen was then quickly inseminated into the hen's left vent in the shape of a doughnut. Twice a week, this was done in the evening. Every time an inseminator was used for insemination, 0.1 mL of fresh, pure semen were used for each hen.

Mating design: The mating design is as shown below:

- **Arbor acre (cock)×Frizzled feather (hen):** AA×FF
- **Arbor acre (cock)×Fulani ecotype (hen):** AA×FE
- **Arbor acre (cock)×Naked neck (hen):** AA×NN
- **Arbor acre (cock)×Normal feather (hen):** AA×NF

Egg collection and incubation: Before the eggs were moved to the hatchery for incubation, the eggs from artificially inseminated chickens were collected according to genetic lines and allowed to accumulate in a cool room at 25°C for 5 days. In a commercial hatchery located in Ibadan, Oyo State, Nigeria, eggs were placed in a cabinet-style incubator (VFDF-192SL-Beijing Yunfeng Limin Livestock Equipment, Co., Ltd., Beijing, China) and kept in a temperature range of 27-39°C and 55-56% relative humidity for 18 days. After that, the temperature and humidity increased to 29-40°C and 70-75%, respectively, until hatching time. In the incubator, the eggs were automatically rotated through ninety degrees. Using a candler fixed with a neon fluorescent tube in a dark environment, candling was done on the 5th and 18th days of incubation to identify transparent eggs and viable eggs.

Management of the chicks: All of the chicks that came from each genotype's lines were correctly recognized at 2 weeks old by having their wings tagged with an industrial aluminum galvanized tag. Every chick was grown using the same rigorous management regimen. From day one, vaccination and medication schedules were properly followed. The day-old chicks were moved to a different brooder pen that had been cleaned beforehand. Each batch was raised for 6 weeks.

Feed and feeding of the chick: From the day old until 4 weeks of age, the chicks were fed a commercial chick mash that included 22% crude protein and 2900 kcal/kg of metabolizable energy on an *ad libitum* basis. They were then fed finisher broiler feed for 12 weeks.

Data collection

Slaughter performance: Forty birds in all, five of each sex and ten of each genotype were slaughtered by hand. Following slaughtering, the birds were physically de-feathered and disemboweled and their corpses were submerged in cold water for 1 hr. After being taken out of the fridge, the carcasses were hung to drip and then dissected into various sections for additional examinations. The yield of the live weight, slaughter weight, dressing weight, breast, thigh, wing, drumstick, back, shank, head, neck and back (external) liver, heart, gizzard, kidney and intestine (internal traits) was determined by weighing each part in grams at the time of slaughter.

Meat quality evaluation: The Home Economics Department of the Emmanuel Alayande University of Technology provided the reflectance colorimeter, a pH meter and a contact grill used and monitored for meat quality. A reflectance colorimeter (Hach DR300) was used to measure the color of the meat in the breast and thighs on the medial side of each muscle. On each piece of meat (thigh and breast), three color readings were obtained, each measured in triplicate.

The L*, a* and b* colour scale was used to measure colour. The L* stands for degree of brightness (0 = black to 100 = white), a* for green (-a*) to red (+a*) and b* for blue (-b*) to yellow (+b*). Each colour parameter's values were averaged collectively. A pH meter (Benchtop pH meter, PH-B400F) calibrated at pH 4.0 and 7.0 was used to measure the pH of the meat from the breast and thighs at 0 and 24 hrs following slaughter. The glass electrode of the pH meter was placed straight into the middle of the meat of the breast and thighs to measure the pH 0 and pH 24 values.

The breast and thigh meat samples, each weighing 50 g were used to calculate the drip, boiling and grilling losses. Samples were suspended in a covered plastic bag on sieved plastic racks for a full day at a temperature between 2 and 4°C. The drip loss was then computed as a percentage of weight lost during storage. The meat from the breast and thighs was weighed, covered with aluminum foil and cooked on a plate contact grill (HEG-811) until the internal temperature reached at 80°C. This is known as the grilling loss analysis. Throughout the grilling procedure, the center of the meat sample was probed with a digital thermometer (SH0803AD) electrode to regulate the core temperature. The sample was taken off the grill, allowed to cool to room temperature and then weighed again. The weight lost during the heating process was used to compute the grill loss, which was then reported as a percentage. Boiling loss was also evaluated by heating samples in a convection oven at 180°C until the core sample reached at 80°C. After allowing the samples to reach room temperature, they were weighed again and the percentage of weight loss that resulted from cooking was calculated.

Consumer sensory analysis: In order to assess the tendencies and testability of crossbred chicken's meat soup, forty consumer-based sensory panels including undergraduate students and staff members from the Department of Home Economics were conducted. Panellists used a nine-point hedonic scale[14] to rate the taste, appearance, flavors and textures of the sample. Product like in relation to panellist preferences was used to define acceptability of appearance, while product liking in relation to juicy was used to describe acceptability of texture. The definition of flavor was likeness to the scent of meat in the food. Six samples (soup or meat), three samples from each crossbreed, were given to each panelist to review. Randomization was used to provide the sample. Panelists were given access to water to rinse their mouths after each sample.

Statistical analysis: Analysis of variance was performed on carcass weight, meat quality and sensory characteristics data using the one-way Analysis of Variance (ANOVA) while the least significant difference was determined using the 2018 version of Duncan's multiple range test while the significance level was at $p<0.05$ and General Linear Model (GLM) procedure of SAS used.

The below model was adopted:

$$Y_{ij} = \mu+\alpha_i+e_{ij}$$

Where:

Y_{ij} = Observed value of a dependent variable

μ = General mean

α_i = Fixed effect of the i^{th} genotype (i = 1, 2, 3, 4)

e_{ij} = Random error common to measurement in each bird and assumed to be normally and independently distributed with a mean of zero and variance δ^2

Ethical approval: The ethical approval for this study was given by the Animal Ethics Committee of the Department of Agricultural Education, Animal Science Division and Home Economics, Faculty of Vocational, Innovation and Engineering Education, Emmanuel Alayande University of Education, Oyo, Nigeria.

RESULTS

The least-square mean values of slaughter performance (cut-part) of the crossbred chickens of Arbor acre and Nigerian Indigenous chickens are presented in Table 1. Significant ($p<0.05$) effect of carcass characteristics and genetic components of chickens used was observed. The results indicated that genetic component chickens of AANN (Arbor acre naked neck crossbred) had highest slaughtered performance values of 2950.80, 2935.90, 2612.60, 250.09, 480.02, 465.81, 300.09, 809.34 and 198.00 g for live weight, slaughtered weight, dressed weight, wing weight, thigh weight, drumstick weight, back weight and breast weight, respectively than its counterpart genetic components involved while followed closely for these slaughtered performances was the genetic components of AAFE (Arbor acre Fulani ecotype crossbred) and least values of the parameters was observed for AAFF (Arbor acre frizzled feather crossbred) genetic component. Table 2 shows the least square mean values of slaughter performance (visceral organs) of the crossbred chickens of Arbor acre and Nigerian Indigenous chickens. There are significant ($p<0.05$) variations between the internal organs and the genetic components of chickens. The results indicated that genetic component of AANN had highest least square mean values for heart (21.90 g), liver (58.78 g), kidney (20.90 g), gizzard (70.02 g) and lowest abdominal fat (45.81 g) whereas, non-significant ($p>0.05$) was observed for lung and spleen, respectively.

The meat quality (pH, colour and water holding capacity) of four genetic components crossbreds of Arbor acre and Nigerian Indigenous chickens is presented in Table 3. There is a significant ($p<0.05$) variation between the meat quality measured and the genetic components of chicken involved. The result depicted that, the pH at 24 hrs of thigh meat, revealed that AAFF (5.88), AAFE (5.89) and AANF (5.87) pH while the lowest pH value was recorded for AANN chickens. The decreases in the postmortem pH are one of the most important issues in the conversion of muscle to meat due to its impact on meat texture, color and water-holding capacity. The result also indicated that the pH value measured in the breast and thigh meats at 0 min was not significantly different among the genetic components.

The colour is an appearance property that is important to consumers as evidence of whether meat products are good or not for them. Significant ($p<0.05$) difference was observed between meat colour (breast and thigh) and the genetic components of the chickens. The result showed that at 0 hr, AANN thigh meat was lightness towards white (L*) while AAFF had darker lightness than other genetic component chickens. The meat colour for thigh at 0 hr also indicated that AANN was (higher b*) yellowness than other genetic components chickens. The thigh at 0 hr revealed similar trend of

Table 1: Least square mean values of slaughter performance (cut-part) of the crossbred chickens of Arbor acre and Nigerian Indigenous chickens

	Genetic components			
Parameter (g)	AAFF	AAFE	AANN	AANF
Live weight	2289.60±23.63[c]	2650.70±56.22[b]	2950.80±90.45[a]	2356.60±45.56[c]
Slaughtered weight	2256.64±45.89[c]	2623.34±89.78[b]	2935.90±78.44[a]	2316.90±75.23[c]
Dressed weight	2089.50±32.24[c]	2400.40±11.87[b]	2612.60±38.89[a]	2189.50±34.32[c]
Wing weight	203.67±6.51[b]	216.12±5.78[ab]	250.09±4.08[a]	210.78±4.67[b]
Thigh weight	432.67±2.54[c]	450.89±3.90[b]	480.02±9.78[a]	435.56±29.54[c]
Drumstick weight	450.55±30.04[b]	459.86±12.71[b]	465.81±40.90[a]	455.91±5.78[b]
Back weight	234.56±8.78[b]	240.90±6.78[b]	300.09±9.34[a]	245.34±8.39[b]
Breast weight	776.45±8.54[b]	790.78±32.85[ab]	809.34±4.68[a]	723.67±32.54[b]
Shank weight	176.56±9.31[b]	185.09±34.83[ab]	198.00±8.89[a]	178.92±12.04[b]

[abc]Means along the same row with different superscripts are significantly (p<0.05) differed, AAFF: Arbor acre frizzled feather crossbred, AAFE: Arbor acre Fulani ecotype crossbred, AANN: Arbor acre neck naked crossbred and AANF: Arbor acre normal feather crossbred

Table 2: Least square mean values of slaughter performance (visceral organs) of the crossbred chickens of Arbor acre and Nigerian Indigenous chickens

	Genetic components			
Parameter (g)	AAFF	AAFE	AANN	AANF
Lung	19.89±0.01	20.10±0.22	19.50±0.40	20.60±0.23
Heart	17.56±0.34[b]	18.89±0.11[b]	21.90±0.23[a]	18.90±0.20[b]
Liver	54.50±0.03[b]	56.00±0.90[b]	58.78±3.08[a]	56.50±4.02[b]
Kidney	17.07±0.51[b]	16.10±1.00[b]	20.90±1.01[a]	17.78±1.01[b]
Gizzard	62.12±8.14[c]	65.19±1.30[b]	70.02±9.23[a]	45.26±9.74[c]
Abdominal fats	56.89±0.04[b]	59.66±1.11[a]	45.81±0.90[c]	58.91±1.02[ab]
Spleen	5.56±0.12	5.70±0.11	5.68±0.01	5.62±0.33

[abc]Means along the same row with different superscripts are significantly (p<0.05) differed, AAFF: Arbor acre frizzled feather crossbred, AAFE: Arbor acre Fulani ecotype crossbred, AANN: Arbor acre neck naked crossbred and AANF: Arbor acre normal feather crossbred

AANN towards white and darker lightness AAFF chickens. The breast and meat color at 0 and 24 hrs for (a* = redness, b* = yellowness) from four genetic components chickens was not significantly different. The breast and thigh meats color at 24 hrs of AANN was more pale (high L*) and less yellow (low b*) than other genetic components chickens whereas redness (a*) was not significantly different for both breast and meat colour at 24 hrs.

There was no significant difference (p>0.05) in the water holding capacity (loss%) between the chickens with different genetic components based on the measurement of drip loss and boiling loss on the flesh of the breast and thighs. Compared to birds with other genetic components, the AANN sample's grill loss of breast and thigh flesh was greater. Water retention capacity, which can be determined by drip or cook loss, is significant for both whole meat and subsequently processed beef products. Inadequate water retention capacity impacts both sensory qualities and functionality.

Table 4 shows the mean scores for overall consumer sensory assessment of crossbred chickens of Arbor acre and Indigenous Nigerian Birds. The results indicated that there are significant (p<0.05) variations between the colour, favour, juiciness, general acceptability and genetic component of chickens used in the study. The AANN sample chickens' meat was more preferred by the panelists in terms of colour, favour, juiciness and general acceptability than other genetic component chickens involved while tenderness of the meats was not significantly (p>0.05) differed.

Table 3: Meat quality of the crossbred chickens' breast and thigh meats of Arbor acre and Nigerian Indigenous chickens

	Genetic components			
Variables	AAFF	AAFE	AANN	AANF
Breast meat				
pH 0	6.45±0.01	6.39±0.02	6.35±0.03	6.33±0.02
pH 24 hrs	4.91±0.03	4.89±0.01	4.90±0.02	4.97±0.01
Thigh meat				
pH 0	6.55±0.02	6.650±0.03	6.657±0.01	6.60±0.01
pH 24 hrs	5.88±0.01[a]	5.89±0.06[a]	5.09±0.02[b]	5.87±0.02[a]
Meat colour (0)				
Breast				
L*	55.908±3.02[c]	56.900±9.10[b]	59.506±8.02[a]	55.08±9.04[c]
a*	1.49±0.02	1.50±0.01	1.46±0.04	1.48±0.03
b*	11.02±0.01	11.08±0.11	10.99±0.02	11.02±0.12
Thigh				
L*	56.990±0.72[c]	60.89±0.37[b]	65.98±0.70[a]	57.90±0.55[c]
a*	1.50±0.02	1.59±0.01	1.60±0.04	1.67±0.03
b*	11.90±0.11[b]	12.02±0.20[b]	12.79±0.05[a]	11.04±0.13[c]
Meat colour (24)				
Breast				
L*	57.109±0.52[c]	58.900±0.10[b]	60.756±0.42[a]	57.908±0.04[c]
a*	1.05±0.01	1.09±0.01	1.10±0.01	1.15±0.01
b*	11.02±0.01	11.08±0.11	10.99±0.02	11.02±0.12
Thigh				
L*	58.456±0.35[c]	63.897±0.45[b]	67.098±0.39[a]	58.667±0.56[c]
a*	5.68±0.21	6.13±0.83	5.08±0.29	7.88±0.99
b*	13.99±0.71[b]	14.02±0.26[b]	14.81±0.45[a]	13.09±0.63[c]
WHC (loss%)				
Breast				
Drip	1.89±0.21	1.90±0.61	1.87±0.29	1.67±0.45
Grilling loss	33.88±1.90[c]	36.90±6.56[b]	40.67±6.34[a]	36.89±4.56[b]
Boiling loss	18.09±0.29	20.88±0.34	19.90±0.66	18.90±0.90
Thigh				
Drip	0.88±0.01	0.87±0.02	0.86±0.01	0.85±0.03
Grilling loss	51.90±2.78[c]	54.34±0.43[b]	58.97±3.65[a]	50.09±5.45[c]
Boiling loss	19.07±0.89	21.56±0.23	25.89±0.89	24.34±0.34

[a,b,c]Mean along the same column at each parameter with different superscripts are significantly (p<0.05) differed, after the chilling to 4°C, 2: 24 hrs after slaughtering, L* = Brightness (0 = black to 100 = white), a* = green (-a*), red (+a*), b* = blue (-b*), yellow (+b*), AAFF: Arbor acre frizzled feather crossbred, AAFE: Arbor acre Fulani ecotype crossbred, AANN: Arbor acre neck naked crossbred and AANF: Arbor acre normal feather crossbred

Table 4: Mean scores for overall consumer sensory assessment (N40) of crossbred chickens of Arbor acre and Indigenous Nigerian birds

	Crossbred chickens			
Variables	AAFF	AAFE	AANN	AANF
Colour	4.68[b]	4.60[b]	5.63[a]	4.23[c]
Flavour	7.20[b]	7.35[b]	7.85[a]	7.60[ab]
Tenderness	8.37	8.40	8.39	8.38
Juiceness	5.25[b]	5.40[b]	6.25[a]	6.00[ab]
Acceptability	7.35[b]	7.40[b]	7.90[a]	7.80[ab]

[abc]Means along the same row with different superscripts are significantly (p<0.05) differed, AAFF: Arbor acre frizzled feather crossbred, AAFE: Arbor acre Fulani ecotype crossbred, AANN: Arbor acre neck naked crossbred and AANF: Arbor acre normal feather crossbred

DISCUSSION

The slaughter performance observed in the current study depicted that various genetic components of chickens responded differently as a result of the individual genetic constitution of the chickens. The present slaughter performance that favoured the genetic component of AANN was in agreement with the finding of Drobnyak *et al.*[5], Sahoo *et al.*[6], Arslan *et al.*[15], Popova *et al.*[16], Bongiomo *et al.*[17], Li *et al.*[18], Uddin *et al.*[19], Mueller *et al.*[20] and Wang *et al.*[21]. These authors claimed that variation in the slaughter performance was on the bases of different genetic stocks present on the individual chickens. Drobnyak *et al.*[5] and Sahoo *et al.*[6] found better slaughter performance for crossbred of KRNN (Kuroiler naked neck) than other genetic groups produced and this corroborated the current findings by Drobnyak *et al.*[5] reported similar ranges of slaughter performance for Yellow Hungarian chickens crossed with different commercial lines on meat production that agreed with this current study. Hailemariam *et al.*[22] claimed that slaughter performance differed due to genetic constitution of the chickens.

In order to ensure better meat quality, the physical characteristics of the muscles and the composition of the flesh are defined, along with the pH, amount of lactic acid, volatile fatty acids, bounded water, solubility of proteins, color and softness. The current study ranges of meat quality documented was in accordance with the findings of Drobnyak *et al.*[5], Arslan *et al.*[15], Bongiomo *et al.*[17], Li *et al.*[18], Mueller *et al.*[20] Hailemariam *et al.*[23] and Popova *et al.*[24] and these authors claimed that meat quality measured solely rest on the genetic constitutes of chicken involved. The postmortem changes that take place when muscle is converted into meat have a great influence on the quality of the meat since after slaughter the glycogen in the muscle is converted into lactic acid causing changes in pH value of the meat. The muscle pH has been reported to affects meat colour, water holding capacity and useful for maintain favorable meat colour and moisture absorption ability. The documented ranges of pH in the current study were similar to those found by Arslan *et al.*[15] in Leghorn chickens. Popova *et al.*[24] reported similar results in respect to breast and thigh pH in male layer-type chickens slaughtered at different ages. Bongiomo *et al.*[17] found similar values of pH for male and female Italian slow-growing chicken breeds: *Bianca di Saluzzo and Bionda Piemontese* chickens. The higher pH values can decrease the shelf life of the meat making it more susceptible to bacterial spoilage and this favored the genetic components chicken of AANN with lower pH and trends of such results was reported by Mueller *et al.*[20] for two dual-purpose chickens and a layered hybrid compared with slow-growing broilers.

The consumer's assessment for meat and soup from the four crossbred's genetic components with respect to colour, favor, juiciness, general acceptability that favored genetic component of AANN than its counterpart indicated that the sensory measured depends on the genetic constituents of the chickens involved and this was in agreement with the studies of Sahoo *et al.*[6], Uddin *et al.*[19], Wang *et al.*[21] and Hailemariam *et al.*[23]. These researchers at their various studies affirmed that consumer rates of meat in respect to taste and eating of meats is a matter of genetic make-up of the animal involved. The findings of Hailemariam *et al.*[23] corroborated the present study. Sahoo *et al.*[6] reported that sensory testing on chickens' meats depends on the genetic chicken stocks involved in the study. The study of Uddin *et al.*[19] revealed that chickens of naked neck meats were more preferred to the Deshi chicken meat and this was in support of current finding that favored Arbor acre naked neck (AANN) crossbred meat in terms of colour, favor, juiciness, general acceptability than other genetic component chickens' meat. Wang *et al.*[21] found that the meats of crossbred were more preferred by the consumer/panelist.

The study proved that for all the four genetic compositions of chicken produced, the Arbor acre naked neck crossbred chickens were better in terms of most of the economic traits measured.

CONCLUSION

It has been established from the study the genetic composition of the chickens affected the slaughter performance, meat quality and sensory assessments of the chickens involved. The slaughter performance was superior for genetic components of Arbor acre naked neck (AANN) crossbred than its counterpart AAFF, AAFE and AANF chickens. Similarly, the meat quality in terms of pH, colour and water holding capacity was observed to be better for AANN than other genetic stocks whereas the sensory assessment analysis also favoured meat from AANN.

SIGNIFICANCE STATEMENT

The assessing the slaughter performance, meat quality and sensory appraiser of crossbred chickens originating from broiler chickens and Nigerian Indigenous chickens indicated a critical exploration into optimizing the potential for enhanced production efficiency and superior sensory attributes since Nigerian Indigenous chicken meat is known for their lower contents of fat and cholesterol coupled with considered rich sources of protein and iron and combination of these attribute with the broiler chickens of high growth with feed efficiency will enhance consumer satisfaction and the study proved that for all the four genetic compositions of chicken produced, the Arbor acre naked neck crossbred chickens were better in terms of most of economic traits measured.

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