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The Effects of Two Protein Sources on the Carcass Characteristics and Haematology Parameters of Indigenous and Exotic Chickens (*Gallus gallus domesticus*)

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Abstract
The study was conducted to investigate the effects of two protein sources on the performance, carcass characteristics and haematology parameters of indigenous and exotic chickens (Gallus gallus domesticus). A total of 100 (50 each) of both local and exotic chickens were used in the feeding trial that lasted for 8th weeks. The birds were assigned to 5 dietary treatments with 10 replicates of the two ecotypes in a Randomized Complete Block Design (RCBD). Feeds containing Groundnut Cake (GNC) and Soya Bean Meal (SBM) of 21% Crude Protein CP as starter and 19% crude protein as finisher was replaced interchangeable at 0%, 25%, 50%, 75% and 100% for treatments A, B, C, D, and E respectively. The bird samples were taken randomly in triplicate at the 8th week for analysis. The results obtained indicate the live weight of both ecotypes; indigenous chickens (871.70g) and exotic chickens (2273.4g) were not significantly different (p>0.05) at diet E (100% GNC). Similarly, there was no significant difference at p>0.05 for dressing percent with treatment C (74.3%) and (69.7%) having the highest dressing percent for both exotic and indigenous chickens respectively. The highest lymphocytes quantity was found in EFD (69.30%) with a notable significant difference (p<0.05) of low lymphocytes content found in IFD (46.30%). Highest neutrophil values were found in exotic chickens (31.24%) but there was no significant difference p>0.05 with IFC (30.10%). The study revealed that feed E with 100% GNC had the highest growth performance in the two chicken ecotypes. It can therefore be concluded that under good management with adequate and nutritionally balanced supplements, local chickens have the potential of good performance. It is therefore recommended that improvement in management and nutritional status of the local chickens could result in increased performance.

Keywords: Chickens, Local protein sources, Carcass, Haematology

INTRODUCTION
The expansion of Nigerian commercial poultry production has great potentials in improving animal protein status of the Nigerian populace. However, the provision of feed in the right quality and quantity presents a great threat in the realization of the goal (Adeniji, 2004). The search for alternative feed ingredients for livestock feeding especially non-ruminants has continued to attract the attention of researchers in the developing nations of the world (Lamidi *et al*.,2008). Poultry meat is an excellent source of animal protein which can be utilized

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to satisfy increasing demands for food in developing world, where increased meat production is of great importance (Ijaiya and Fasanya, 2004).The proportion of dressed weight to live weight is often used as measure of meat production in farm animals. Therefore, there is relationship between weight and physical characteristics of animals, which is a reflection of feed efficiency and performance, this association has been used to examine relationship with economic characteristics such as meat yield and reproductive performance (Maciejowski and Zieba, (1982); Ijayi and Fasanya, 2004).

The first step inmoving from survival, free range environment to a high level of poultry production is to improve the nutrition of the animal through the appropriate use of different types of feed stuff. Soya bean (*Glycine max*) and groundnut (*Arachis hypogea*) have been playing roles in the feeding of non ruminants, despite the serious competition with man (Emenalom, 2004). Chicken (*Gallus gallus domesticus*) is a domesticated fowl a subspecies of thered jungle fowl (Wikipedia,2003).According to Nwosu *et al.* (I985) over 80% of the chickens in Nigeria are managed at the household level almost exclusively with, indigenous local ecotypes chickens in some of scavenging system (Afolabi, 2001)

Afolabi (2001) estimated the Nigeria Local chicken population at 1.50million.
The Nigeria indigenous chickens are self-reliant and hardy birds with the capacity to withstand harsh weather condition and adaptation to adverse environment (Momoh *et al., 2007)*. According to Akinwunmi (1979) Nigerian local chickens are known to possess qualities such as the ability to hatch on their own, brood and scavenge for major parts of their food and possess appreciated immunity to endemic diseases. Poultry breeding in Nigeria Started in 1985 at the National Animal Production Research Institute, Zaria stated Abebe (1992).

MATERIALS AND METHODS

Study Area and Duration

The study was conducted at the Department of Animal Science Research Farm, Bayero University, Kano. Kano State lies between longitude 9°30' and 12°30' North and latitude 9°30' and 8°42' East. The area is characterized by a long dry season lasting from October to April and a short rainy season lasting from May to September. The annual rainfall ranged from 787mm to 960mm and the temperature from 21°C to 39°C (Olofin, 2007).

Experimental Birds and Feed Formulation

A total of 100-day old chickens of both sexes, 50 each for both local and exotic types were used in this study. The local chickens were obtained from Panisau, Dausayi and Panshekara, around Kano metropolis. The exotic chickens were purchased from Zarm Hatchery Illemona, Kwara State. The chickens were transferred to a brooder house in a deep litter system. Normal management procedures as outlined for the tropics by Oluyemi and Roberts (2007) were put to good use. The chicks were randomly allocated to five dietary treatments with 10 replicates of both ecotypes in a Randomized Complete Block Design (RCBD). Five diets (21%) were formulated in which GNC was incorporated to replace SBM at 0%, 25%, 50%, 75% and 100% levels coded as diets A, B, C, D and E respectively. The substitution levels were maintained for both starter and finisher rations. Birds were fed starter mash from 0-4 weeks and finisher mash from 4-8 weeks. The feed and water was given ad libitum.

Data Collection

All birds were weighted before the commencement of feeding trials to obtain the initial weight, thereafter the birds were weighted weekly. Daily feed intake was determined for each treatment by subtracting the quantity of the feed left over from the initial weight of the feed offered. Values obtained for each treatment were recorded. Water was provided ad libitum and the quantity consumed was recorded daily according to Adesoye (2004).

Haematology Analysis

Blood sample of the experimental birds was obtained by bleeding the birds (3 chickens for each treatment of both ecotypes) through the wing vein using a 3 ml syringe and 23 gauge needle, then immediately transferred into the test tube containing EDTA for haematological determination as described by Jain (1993).The samples were kept in an icebox, using ice packs and transferred to laboratory for further analysis. The haematological parameters were carried out using SUYSTEM KX 21-JAPAN to analyse for Hb, PCV, RBC, MCV, MCHC, MCH, WBC, Netrophils, Lymphocyte and Emb.

Carcass Characteristics

Evaluations of Carcass characteristics, (slaughter weight, live weight and dressing percent) were determined according to the standard proportion as described by Ikurior and Anthony (1993). Three (3) birds per replicate of the both ecotypes were used. The values obtained were expressed as percentage of live weight for each bird.

STATISTICAL ANALYSIS

The data generated were subjected to Analysis of Variance (ANOVA) and means were compared using Duncan Multiple Test

RESULTS

The hematological parameters of the experimental chickens as presented in Table 1 demonstrated that HemoglobinHb (g/dl) ranged from 8.33g/dl – 9.00g/dl and showed no significant difference in all the treatments; Red Blood Cells RBC was found lowest 2.00g/dl (IFA, IFD, IFE, EFB, EFD and EFE) and highest 2.66g/dl (IFB); Mean Corpuscular Volume MCVfi varied from 141.33fi – 144.33fi was insignificantly different in all treatments; Mean Corpuscular Haemoglobin Concentration MCHC content was from 24.33g/dl (EFE) to 30.33g/dl (IFB, IFC); Mean Corpuscular Haemoglobin MCHpg from 38.00pg – 44.66pg (IFB, IFC); neutrophils ranged from 22.00% (IFD) – 31.20% (IFC, EFA and EFE); lymphocytes from 46.30% (IFD) to 69.50% (EFB and EFD) and Emb was 4.20% to 5.54% showed no difference in all treatments. Table 2 presents the feed intake, carcass and dressing percent of the experimental chickens. There was no significant difference in all treatments in feed intake which varied from 0.50kg to 0.93kg; similarly the dressing percent was from 53.27% to 74.31%; Live Weight LW ranged from 2273.4g (EFE) to 334.3g (IFD); Slaughtered Weight SW from 216.7g (IFD) to 1230.0g (EFC); Defeathered Weight DFWT varied from 232.3g (IFA and IFD) to 1110.7g (EFC) and carcass ranged from 217.1g (IFA, IFC and IFD) to 864.1g (EFC and IFE).

Table 1: Haematological Parameters of Experimental Chickens

	Treatments									
Variables	IFA	IFB	IFC	IFD	IFE	EFA	EFB	EFC	EFD	EFE
Hb (g/dl)	8.33^{a}	9.00^{a}	9.00^{a}	8.66^{a}	8.66^{a}	9.00^{a}	9.00^{a}	9.00^{a}	9.00^{a}	9.00^{a}
RBC(g/l)	2.00^{b}	2.66^{a}	2.33^{ab}	2.00^{b}	2.00^{b}	2.33^{ab}	2.00^{b}	2.33^{ab}	2.00^{b}	2.00^{b}
MCV(fi)	142.00^{a}	144.00^{a}	142.00^{a}	141.33^{a}	142.33^{a}	144.33^{a}	141.66^{a}	143.00^{a}	141.66^{a}	144.00^{a}
MCHC(g/dl)	27.66^{d}	30.00^{a}	30.33^{a}	29.00^{b}	26.66^{c}	29.66^{ab}	26.00^{c}	29.00^{b}	26.00^{c}	24.33^{e}
MCH (pg)	39.00^{ef}	44.33^{a}	44.66^{a}	42.66^{b}	40.44^{c}	38.66^{ef}	40.66^{c}	44.00^{ab}	40.00^{cde}	38.00^{f}
WBC(10^9/L)	2.00^{b}	2.00^{b}	2.33^{b}	2.00^{b}	2.33^{b}	4.60^{a}	2.00^{b}	2.33^{b}	2.00^{b}	2.00^{b}
Neutrophils(%)	23.71^{ab}	23.70^{ab}	30.10^{a}	22.00^{d}	25.40^{c}	30.20^{a}	28.00^{b}	29.60^{b}	28.30^{b}	31.20^{a}
Lymphocytes (%)	67.31^{ab}	49.50^{e}	59.30^{d}	46.30^{ef}	47.50^{ef}	68.90^{b}	69.50^{a}	63.40^{c}	69.30^{a}	67.30^{ab}
Emb (%)	4.55^{a}	4.20^{a}	4.25^{a}	4.20^{a}	4.20^{a}	5.39^{a}	5.45^{a}	5.45^{a}	5.54^{a}	5.34^{a}

Note – Means with the same superscripts are not significantly different ($p > 0.05$)

I –Indigenous chickens, E- Exotic chickens, F – Feed of the experimental chickens A, B, C, D and E are the treatments of the experimental chickens

Table 2: Feed Intake, Carcass and Dressing Percentage of the Experimental Chickens

Treatments										
Variables	**EFA**	**EFB**	**EFC**	**EFD**	**EFE**	**IFA**	**IFB**	**IFC**	**IFD**	**IFE**
LW (g)	1255.7^{b}	907.3^{b}	1493.3^{b}	1069.7^{b}	2273.4^{a}	403.0^{ab}	455.1^{ab}	449.0^{ab}	334.3^{ab}	871.70^{b}
SW (g)	908.3^{b}	620.0^{bc}	1230.0a	822.1^{b}	570.4^{bcd}	886.3^{cd}	347.9^{cd}	306.4^{cd}	216.7^{d}	468.8^{cd}
DFWT (g)	789.7^{b}	501.3^{bcde}	1110.7^{a}	696.4^{bc}	611.4^{bcd}	262.4^{e}	315.6^{de}	274.3^{e}	232.3^{e}	406.8^{cde}
Carcass (g)	652.5^{ab}	330.4^{cd}	864.1^{a}	590.2^{abc}	424.2^{bcd}	217.1^{d}	355.6^{bcd}	236.5^{d}	242.7^{d}	748.5^{a}
Dressing (%)	62.75^{a}	57.50^{a}	74.31^{a}	64.96^{a}	53.27^{a}	65.03^{a}	59.70^{a}	61.58^{a}	69.66^{a}	56.64^{a}
Feed intake(kg)	0.91^{a}	0.88^{a}	0.93^{a}	0.88^{a}	0.88^{a}	0.63^{a}	0.50^{a}	0.59^{a}	0.56^{a}	0.57^{a}

Note – Means with the same superscripts are not significantly different ($p > 0.05$)

I –Indigenous chickens, E- Exotic chickens, F – Feed of the experimental chickens A, B, C, D and E are the treatments of the experimental chickens

DISCUSSION

Feed Consumption and Body Weight Gain

The feed consumption per bird showed a range of 0.50kg to 1.00kg per bird within the eight weeks duration of the experiment. These values are within the range of 0.75-2.75kg per bird to market size recommended by Oluyemi and Roberts (2007). Adebukunola *et al.* (2010) observed average feed intake per bird to be 3.3kg to 3.4 kg when birds were fed with macaroni waste based diet for 12 weeks. Although the feed intake was highest in all the exotic type chickens 0.93kg and lowest in the indigenous type 0.50kg. This is indeed in line with Ranjhan (1980) who stated that exotic birds have good food conversion ratio. The low feed intake in this study cannot be attributed to the GNC and or SBM in the diet as all the treatments had similar values although treatment C with 50% GNC and 50% SBM recorded the highest in exotic (EFA) and treatment A recorded the highest in the indigenous chickens (IFA).

The general low feed consumption could be attributed to the high environment temperature condition at the time of the experiment which rose to about 44°C at a point in the course of the experiment. Etches *et al.* (1995) reported that increase in environmental temperature results in low feed intake because high feed intake result in increase in heat production. This may be the reason for the values obtained as it contrast with that of Ranjhan (1980), who obtained marketable body weight 2.75 kg live weight at 8 weeks of age for exotic chickens fed different fibre sources. The values however agreed with those of Rodriguez and Preston (1999),who reported an observation on scavenging (local) and Tarn Hoang (exotic) chickens given free access to duckweed.

Carcass Characteristics

The carcass characteristics of birds fed with various experimental diets (Table 2) from the results live weight of the different poultry birds differed significantly across all the treatment evaluated. However, exotic bird EFE had a higher LW (2273.4g) while, treatment IFD had the least (334.3g). This indicated that all exotic are superior to local chickens except for IFE which showed no significant difference ($p>0.05$) with exotic chickens (EFA, EFB, EFC, EFD). The result shows that the values obtained for live weight (LW) of the indigenous IFE (871.70g) have the same superscript with that of all the exotic except for Exotic EFE (2273.4g) this agrees with the result obtained byDemeke (2003) who compared the performance of white leghorn and local chicken. For the same parameters there was no significant difference in the dressing percent in local and exotic ecotypes chickens. The result is also in line with the findings of Lamidi *et al.*(2008) who reported the dressing percentage of 73.98% for broiler chicken. The result further tend to agree with Oluyemi and Robert (2007) who suggested that livestock improvement especially in Nigeria is not basically from the genetic code of the animal, but from nutritional aspect of it.

Haematological Parameters

There was no significant difference in the Hb and Emb values obtained, and these values fall within the normal values (7.0 - 13.0g/dl) for haemoglobin, (90.0 -140,0fi) MCV, (1.5 - 6.0%) Eosinophil, (5.0 - 10.0%) Monocyte and Basophil, as reported by Jain (1993). Although all the other values obtained for haematology were significantly different, the values still fall within the normal range as stated above. The values obtained are not drastically different between the two ecotypes, thereby suggesting that the feed consumed does not have any harmful effect on the chickens (Meluzzi *et al.,* 1992).The current results correspond to that of Lamidi *et al.* (2008) who reported that pineapple crust waste had no effect on blood parameters for broiler chickens.

CONCLUSION

It can be concluded that under good management with adequate and nutritionally balanced supplements, local chickens have the potential of good performance. Although in terms of growth performance exotic chickens are more suitable to intensive system of management than the local chickens and are more responsive to supplementation. However, the local chickens are more disease resistant and adaptive to their environment. Thus, improvement in management and nutritional status of the local chickens could result in increased output per head.

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