INFLUENCE OF GRADED LEVELS OF INSTANT NOODLE WASTE IN THE DIETS ON THE PERFORMANCE, CARCASS TRAITS AND HAEMATOLOGY OF BROILER CHICKENS

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ABSTRACT

An eight week feeding trial was conducted to assess the replacement value of instant noodle waste meal (INW) on the performance characteristic, carcass and haematological parameters of broiler chickens. Ninety, one-day old Anak 2000 chicks were randomly allocated to three treatment groups namely, diet 1 (0% INW), diet 2 (50% INW) and diet 3 (100% INW) in a completely randomized design (CRD). Each treatment group had three replicates of ten chicks each. The inclusion of instant noodle in the diet did not have significant (P>0.05) effect on the performance of the broiler chickens at both starter and finisher phases. The inclusion of instant noodle waste had no significant (P>0.05) effect on the carcass traits and organ weights in broiler chickens. No significant (P>0.05) effect was observed for the packed cell volume, hematocrit, haemoglobin, leucocytes, and mean corpuscular haemoglobin concentration among the treatments. However, mean corpuscular volume and mean corpuscular haemoglobin were significantly (P< 0.05) influenced by the instant noodles inclusion, in the diets. Based on the present results INW could replace maize fraction of the diet partially or wholly without any adverse effect on performance, carcass and health status of broiler chickens.

Keywords: **Broiler chickens, Instant noodle waste, Performance Carcass traits, Haematological indices**

INTRODUCTION

The intake of animal protein in Nigeria was estimated to be 4.82g/head/day (Manary, 2013) compared to the recommended minimum intake of 35g/head/day require for proper growth, reproduction, lactation, health and survival (FAO, 2009) . The observed low level of animal protein intake has its root cause in the high cost of feeding farm animals for optimum growth and production (Durumae*t al.,* 2006) as feed constitute up to 76, 74 and 73 % of the cost of production for the small, medium and large scale producers (Olorunsanya, 2004). Hence, the key to sustainable animal production is availability of cheap feed as feed is the major determinant of livestock production in terms of quantity, and turnover rate (Olorunsanya, 2004).

Poultry production especially the production of broiler chickens offers the greatest scope for increasing the quality and quantity of protein intake in Nigeria because of the short generation interval and prolificacy (Ezema and Eze, 2009). The chief source of energy in the diets for monogastric animal in Nigeria is maize (*Zea mays*), but it is also required by man and processing industries. There has been an increasing demand for maize in Nigeria and this has resulted in the escalation in the price, and reduction in the amount used in diet for livestock; this therefore calls for concerted effort in search of alternative cheap sources of feed ingredients that have little or no competition from human consumption (Ukachukwu, 2005).

Agro industrial waste by-products in recent years have become popular feed components in poultry diets in Nigeria (Eustace, 2005 and Adeyina *et al*., 2008). Examples of such products include wastes from the kitchen, from the canning industries, potato pomace waste, citrus fruit wastes, bakery waste, kolanut testa meal, cocoa kernel meal, pigeon pea meal, bambara groundnut meal, cashew nut waste meal, etc. Adeyeye (2005) observed that the use of decorticated cashew nut meal in place of soya bean meal in broilers feed enhanced the carcass traits of broiler chickens. Leaves and tender stem of cassava have been incorporated into broilers feed with encouraging result (Aderemi,*et al*., 2004). Oyedeji *et al* (2015) reported no detrimental effect of blood rumen content mixture (BRCM) meal supplemented with yeast on the performance and gut microbial populations of broiler chickens. Also Lamidi*et al.* (2008) observed no adverse effect on the performance of chicken when 10% pineapple crush meal was used to replace maize. Omoikhoje *et al*. (2010) reported enhanced growth, nutrient digestibility and blood profile when corn flakes waste was incorporated into broilers diet to replace 75% maize. Aderolu *et al*. (2011) also observed a better growth performance in African catfish as a result of inclusion of instant noodle waste to replace 75% maize.

Since the introduction of instant noodle meal into Nigeria culinary, it has become popular, well accepted and found in the kitchen of almost all Nigerian homes (Business News, 2006). This has resulted in the great explosion of the industry and corresponding level of waste from this

sector. Instant noodle has several advantages over other non-conventional feed ingredients: since instant noodle is meant for human consumption, it is hygienically packaged and this removes the fear of contamination. Instant noodle waste has no known anti-nutritional factors, and it also possesses higher metabolizable energy than maize (Laila *et al*., 2010; Eniolorunda, *et al*., 2008). The proximate composition of instant noodle waste (INW) has been reported to be comparable to that of maize (Laila *et al*., 2010) as shown in Table 1. Instant noodle waste is a suitable energy source, it is not in direct competition with humans as food, need no further processing before its inclusion in the diet, has a stable and affordable price when compared with maize. With the recent increase in consumption and acceptability of instant noodles as fast food in the country and the complementary increase in producers and production, a lot is being discarded as waste. This study was therefore designed to determine the performance characteristics and haematological indices of broiler chickens fed varying levels of instant noodle waste meal.

MATERIALS AND METHODS

Location of the study: The experiment was carried out at the Poultry Unit of Teaching and Research Farm of Ambrose Alli University, Ekpoma for a period of eight (8) weeks.

Sources of ingredients: The instant noodle waste for the feeding trial was purchased from Dangote Flour Mills, Ilupeju-Lagos, Nigeria. Other feed ingredients were sourced from Ekpoma, Edo State of Nigeria.

Experimental chicks design and management: A total of ninety day-old broiler chicks were used for the study. The chicks were randomly assigned to three dietary treatments namely diet 1 (0% INW), diet 2 (50% INW) and diet 3 (100% INW). Each treatment group contained three replicates of ten chicks each. All the chicks were brooded for four weeks in a deep litter system. The house, feeders and drinkers were properly washed and disinfected. The chicks were fed a commercial broiler starter diet for one week acclimatization period. All through the feeding trial, the birds had free access to the experimental feeds and clean water *ad libitum*. Routine medication, vaccination and other management practices were carried out.

Experimental diets: A total of three treatment diets of both starter and finished phases were formulated as reflected in Table 2. Diet 1 was formulated to contain 0% instant noodle waste meal (INW), while diets 2 and 3 were formulated by replacing the level of maize in Diet 1 with 50 and 100% levels of INW respectively. All the diets were formulated to be isonitrogenous (21 and 19% crude protein for the starter and finisher phase respectively) and isocaloric (2800 and 3000.ME Kcal/kg for the starter and finisher phase respectively).

Performance characteristic study:

Prior to the beginning of the experiments, the birds were weighed to obtain their initial body weight and subsequently on weekly basis. The performance parameters measured were feed intake, body weight gain and feed conversion ratio.

Feed intake: A known quantity of feed was given to the chicks on daily basis while the leftover of feed was weighed to determine daily feed intake and consequently weekly feed intake. All birds were fed *ad libitum* each day to ensure adequate access to feed.

$$\text{Feed intake per bird} = \frac{\text{Feed supplied} - \text{Leftover of feed}}{\text{Number of birds}}$$

Weight gain: The live weight gains were recorded on weekly basis. The initial live weight was deducted from the final live weight and divided by the number of birds per treatment compartment. Birds were usually weighed before feeding in the morning.

$$\text{Weight gain} = \frac{\text{Final live weight} - \text{Initial live weight}}{\text{Number of birds/treatment/replicate}}$$

Feed conversion ratio: Feed conversion ratio of each group of birds was determined by calculating the ratio of feed intake to weight gain and thus calculated as:

$$\text{Feed conversion ratio (FCR)} = \frac{\text{Feed intake}}{\text{Weight gain}}$$

Carcass quality study

At the end of eight weeks feeding trial, the birds were fasted overnight and two chickens were selected from each replicate and weighed. Thereafter, the birds were slaughtered, bled,

plucked and eviscerated. The weights of the plucked and eviscerated chickens were taken, while the eviscerated weight relative to the live weight was used to estimate the dressing percentage of the birds. Later, the dressed chicken was cut into parts such as: the thigh, drumstick, breast, wing, shank, head, neck and back and their weights taken relative to the eviscerated weights.

Blood sample collection and preparation: Three birds each were randomly selected from each replicate on weight equalization basis and blood samples were collected terminally from each of them through wing vein using syringe and needle. About 5ml of blood sample were collected from each bird into a labeled ethylene diamine tetra acetic acid (EDTA) specimen bottles for haematological indices determination.

Determination of haematological indices: Packed cell volume (PCV), red blood cell (RBC), white blood cell (WBC), haemoglobin were determined using improved Neubaurhaemacytometer after dilution and cyanomethaemoglobin methods respectively as described by Dacie and Lewis (1991), while the standard ratios of the mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration were calculated according to Jain (1986).

Statistical analysis

The experimental design was a Completely Randomized Design (CRD) and data obtained were subjected to Analysis of Variance (ANOVA). Significant differences among treatment means were determined using Duncan Multiple Range Test as contained in SAS (2011) package.

RESULTS AND DISCUSSION

The performance characteristics of broilers fed diet differing in INW are presented in Table 3. At the starter phase, no significant difference ($P > 0.05$) was observed in all the growth parameters tested for. However, highest daily feed intake was observed in diet 3, while least value was obtained in diet 2. The values obtained for average daily weigh gain showed that birds fed with diet 2 had the best weight gain compared to diets 1 and 3. The result also showed that there was better utilization of diet 2 as indicated by the calculated feed conversion ratio. At the finisher's phase, there was no significant difference in the values obtained for average daily feed intake and average live weight, there were significant differences ($P < 0.05$) in the values observed for average daily weight gain and the feed conversion ratio at this phase. However, the values obtained for diets 1 and 3 were significantly similar; higher feed intake observed in diet 3 is in agreement with the findings of Olayemi (2007) and Eniolorunda, *et al.* (2008) who reported an increase in feed intake as the INW increases from 0-100%.

Data on the carcass characteristics of broiler chickens are shown in Table 4. It was observed that the inclusion of instant noodles did not have significant (P>0.05) effect on the carcass characteristics of broiler chickens. The values obtained for the average live weight, defeathered weight, eviscerated weight, dressing percentage, the drumsticks, breast, thighs and wings numerically higher at diet 2 and reduced to the lowest at diet 3. Since the average live weight, defeathered and eviscerated weights were not significantly (P>0.05) increased as the level of inclusion of INW increased in the diets, it therefore implies that the quality of the test ingredient in the diets is capable of effective tissue synthesis in finisher broiler chickens under the same environmental condition. The dressing percentage of broiler chickens (ranged between 80.86 and 85.92) were significantly similar amongst the treatment groups and the values obtained are consistent with the range of values reported by Lamidi*et al* (2008), Fapohunda *et al.,* (2008), and Adejinmi *et al.,* (2011) for broiler chickens.

The results on haematological indices (Table 5) revealed that packed cell volume (PCV), red blood cells (RBC), haemoglobin (Hb), white blood cells (WBC) and mean corpuscular haemoglobin concentration (MCHC) were not significantly (P>0.05) different from one another, while mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) were significantly (P<0.05) affected by the test diets.. This result was in agreement with Akinola and Etuk (2015) and Mitruka and Rawnsley (1997). The haemoglobin values obtained in this study indicate that the oxygen carrying capacity of the bird's blood by haemoglobin was relatively the same. It has also been established that an animal with decrease in the level of haemoglobin in the blood is indicative of poor nutrition including dietary deficiency of iron, amino acid and vitamins (Afolabi and Oladimeji, 2003; Mitruka, and Rawnsley 1997; Aletor, and Egberongbe, 1992). The WBC plays a major role in defending the body against disease-producing bacteria, viruses and fungi; a deficiency in WBC may result in an increased susceptibility to infections. A decrease in white blood counts is a reflection of the decline in the production of WBC for defensive action against infection.

The results obtained in the study buttress the fact that INW had no detrimental effect on health status of the birds and could be used as alternative feed resource in the diet of broiler chickens. Mean corpuscular volume was significantly (P<0.05) highest in broilers maintained on diet 3, followed by those that ate diet 1 and least in those maintained on diet 2. Mean corpuscular haemoglobin was significantly (P<0.05) higher in birds maintained on the control diet (diet 1), followed by those that ate 100% IWM (diet 3) and least in those maintained on the 50% INW (diet 2) based diet. Blood is very vital to life and any abnormal variation in the haematology of the cell impairs the primary physiological functions of the animal's body (Akinmutimi, 2006; Bamgbose *et al*; 2004; Omoikhoje *et al;* 2010). Esonu *et al* (2001) reported that haematological constituents are reflection of animal's responsiveness to both internal and external

environments which include feeds and feeding. The haematological parameters obtained suggest that all the broiler chicken irrespective of the test diet inclusion level had normocytic and normochromic red blood cells.This implies that the inclusion of INW up to 100% did not affect the utilization of iron by the birds. The similarities in the values of PCV, RBC, Hb, and MCHC among the birds irrespective of the test diets could be an indication that the test diet has no adverse effect on the erytopoiesis activities of the chickens fed the test diet; since haematocrit and haemoglobin are known to be positively correlated with protein quality and protein level in the feed; the increase in the levels of MCV and MCH as the level of INW increased indicates the high quality of the diets. All the haematological values including the WBC fell within the normal range for healthy broiler chickens (Maxwell *et al*, 1990; CCAC, 1993; Ikhimioya, *et al*., 2000; Banerjee, 2009; Nkwocha, *et al*., 2014)

CONCLUSION

Instant noodles waste meal (INW) could replace maize in the diet of broiler chickens. The haematological indices and carcass yield of broiler chickens in this study revealed the adequacy of the INW inclusion up to 100% level in broiler diets; however, better result was achieved in birds fed diet containing 50% INW.

Table 1: Proximate composition of instant noodle waste and maize (% dm).

Composition	INW	Maize
Dry matter (%)	89.00	91.80
Crude protein (%)	8.57	8.90
Crude fibre (%)	2.80	2.70
Ether extract (%)	17.14	4.00
Ash (%)	0.90	1.30
NFE	59.59	74.90
ME (Kcal/Kg)	3799	3315

Source: Laila (2010)

Table 2: Composition of experimental starter and finisher diets

	Starter phase			finisher phase		
Ingredients	T1	T2	T3	T1	T2	T3
Maize	42.90	21.45	0.00	53.10	26.55	0.00
Instant noodle waste	0.00	21.45	42.90	0.00	26.55	53.10
Soya bean meal	21.75	21.75	21.75	27.75	27.75	27.75
Groundnut cake	15.00	15.00	15..00	15.00	15.00	15.00
Fish meal	1.00	1.00	1..00	1.05	1.05	1.05
Wheat offal	16.24	16.24	16.24	0.00	0.00	0.00
Oyster shell	2.36	2.36	2.36	2.38	2.38	2.38
Premix	0.25	0.25	0.25	0.25	0.25	0.25
DL Methionine	0.10	0.10	0.10	0.10	0.10	0.10
DL Lysine	0.10	0.10	0.10	0.10	0.10	0.10
Salt	0.30	0.30	0.30	0.30	0.30	0.30
Total	100	100	100	100	100	100
Crude Protein %	21.20	20.70	20.85	18.82	18.74	18.66
Metabolizable energy (Kcal/Kg)	2800	2813	2825	3000	3015	3031

Table 3: Performance characteristic of broiler chicken fed the experimental diets

	Starter phase				Finisher phase			
Ingredients	T1	T2	T3	SEM	T1	T2	T3	SEM
Average live weight (g/bird)	533.33	536.67	473.33	26.03	2130	2300	2100	0.09
Average daily feed intake (g/bird)	63.01	62.70	65.87	2.78	136.06	135.39	141.73	0.56

Average daily weight gain (g/bird)	29.30	32.06	29.81	0.72	55.83[b]	63.20[a]	55.56[b]	0.51
Feed conversion ratio	2.16	1.96	2.21	0.18	2.44[a]	2.14[b]	2.55[a]	0.08

[ab]Means in the same row with differentsuperscripts differ significantly (P>0.05)

Table 4: Carcass Traits of broilers chicken as affected by the dietary treatments

	Diets			
Carcass traits	1	2	3	SEM±
Average live weight (Kg/bird)	2.13	2.30	2.10	0.09
Defeathered weight (Kg/bird)	2.03	2.20	2.01	0.09
Eviscerated weight (Kg/bird)	1.83	1.98	1.70	0.17
Dressing (%)	82.20	85.92	80.86	0.78
Cut parts (%):				
Drumstick	13.25	13.90	12.88	0.66
Breast	16.83	17.78	16.13	0.51
Thigh	16.33	16.91	15.99	0.77
Wings	12.62	12.87	12.53	0.27

Table 5: Haematological indices of broiler chickens as affected the dietary treatments.

	Diets			
Indices	1	2	3	SEM±
PCV (%)	31.63	32.80	29.03	0.96
RBC (x 10^6/µl)	2.47	2.61	2.20	0.08
Hb (g/dl)	10.30	10.53	9.40	0.38
WBC (x 10^3/µl)	260.13	271.70	257.10	2.43

MCV (fl)	128.80[b]	125.83[c]	132.50[a]	0.21
MCH (pg)	42.77[a]	40.23[c]	41.73[b]	0.25
MCHC (g/dl)	32.50	32.07	32.37	025

abc Means in the same row with different superscripts differ significantly (P<0.05).

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