PERFORMANCE AND HAEMATOLOGICAL PARAMETERS OF PULLETS FED VARYING LEVELS OF BAMBARANUT WASTE.

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Abstract

A six week study was carried out to investigate the effects of feeding varying levels of bambaranut (Voandzeia subterranean) waste based diets (BNW) on performance and haematological parameters of pullet chicks. Ninety six day old pullet chicks were randomly divided into five treatment of 18-19 birds per treatment. Each treatment was replicated two times with 9-19 birds per replicate. The five treatments T1, T2, T3, T4, and T5 were fed five diets containing 0, 13.70, 27.70, 41, 50, and 55.20% (BNW) respectively for six weeks. The experimental design was a completely randomized design (CRD). Data were subjected to a one way analysis of variance (ANOVA). Treatment means were separated using Duncan's multiple range test. Total weight gain and daily weight gain did not follow any specific trend but showed significant ($P<0.05$) differences. Feed conversion ratio improved steadily from T_5 (10.10) to T_1 (6.02) wit T_1 having the best. Feed cost (Kg/₦) decreased steadily from T_1 (47.12) to T_5 (18.92). Feed cost/Kg gain followed the same trend The performance parameters measured were live weight gain, final body weight, feed intake, feed conversion ration (FCR), cost of daily feed intake and cost of feed per kg weight gain. The blood cellular components, white blood cell (WBC), red blood cell (RBC), eosinophils, neutrophils, basophil, packed cell volume (PCV) and haemoglobin (HB) were also measured. The results showed that BNW had no adverse effect on the performance characteristic of six weeks old pullet chicks. The blood cellular components, white blood cell (WBC), red blood cell (RBC), eosinophils, PCV, Haemoglobin and basophil were not significantly ($P>0.05$) different and were within the normal range. Only the neutrophil was significantly ($P<0.05$) different. Bambaranut waste can be included in diets of pullet chicks up to 41.50% (T4) for optimum performance and to reduce cost of production.

Keywords: Bambaranut Waste, Pullets, Performance, Haematological.

INTRODUCTION

The demand for protein especially of animal origin has been shown to be important in the diet of man. An average Nigerian for instance, consumes only about 10g/person per day compared to the minimum daily intake of 35g recommended by Food and Agricultural Organization (FAO, 1997). Ani and Adiegwu (2005) had suggested that a solution to the problem of inadequate consumption of animal protein by an average Nigerian is to increase the level of animal production, intensifying the production of highly reproductive animals with short generation interval such as poultry, pigs and rabbits, (Fielding, 1991). Poultry is the quickest source of meat and it production involves the least hazardous and arduous process in relation to other livestock enterprises (Obioha, 1992). Poultry are able to adapt to most areas of the world, have a low economic value, rapid generation time and a high rate of productivity (Smith, 2001). Although, the contribution of poultry to human nutrition in the tropics is already appreciable, it is but a small fraction of what is could be under the present conditions. The greatest incentive to the domestic poultry owner is the fact that the birds find their own food and accommodation almost without any expenses to him and that every thing they produce from faecal fraction to eggs and flesh earn him a net profit.

The cost of conventional feed stuff, which are major sources of energy and protein in poultry diets, has continued to increase (Defang et al., 2008) due to their short supply. There is also stiff competition between human consumers, industrial processors and other users, for conventional feed stuffs like maize, sorghum, soybean and fish meal (Agbede et al., (2002). This has resulted in the high cost of broiler feed, causing economic looses in broiler production in Nigeria. There is therefore, the need to continue to source for alternative sources of energy and protein that are not likely to face such competition and demand as the conventional feedstuffs. Such a feedstuff should not be food for man and should also have very limited or no industrial use.

To counter this increase in the price of conventional feedstuff and produce poultry product of affordable prices, the use of agro-industrial by-products in poultry feeding must be exploited in Nigeria. There is evidence in literature that the use of agro-industrial by products reduces the cost of feed as they attract little pricing (Onyimonyi 2002; Onuh, 2005). One of such readily available agro-industrial by-products in Nigeria is bambaranut waste. Bambaranut waste is the by-product obtained from the milling of bambaranut. It has no direct feeding value for human, and in most places it is dumped indiscriminately thus causing environmental problems.

The search for cheaper feedstuff continue to be very central to the research efforts of animal nutritionists in the tropics because of the critical need to find alternative less expensive feed ingredients that can substitute for the more conventional feedstuff in feeding animal.

Also the fact that Bambaranut waste is available in large quantities in Anyigba and it environs. Offers justification for this work.

Since bambaranut waste has little or no metabolic inhibitors and Toxin, the aim of toasting is to give it the sweet aroma (Onyimonyi and Okeke, 2007). This aroma attracts pullet to feed on it.

The objective of this research work therefore was to evaluate the performance and haematological responses of pullet chicks fed varying levels of bambaranut waste.

MATERIALS AND METHODS

This experiment was carried out at the poultry unit of Kogi State University Livestock Teaching and Research Farm, Anyigba located in the Guinea Savanna zone of Nigeria on latitude $7^0 6'$ N and longitude $6^0 43^0$E. The area is characterized by about 6-7 months of rainfall ranging from 1400-1500mm annually. The ambient temperature on the average in Anyigba is 25^0c to 35^0C with highest in March and April (Kowal and Knabe, 1972)

The vegetation consists of rainforest on the western part and the tropical wood land savanna and grass land to the western part. There are notable economic trees grown including locust bean, crops grown includes cassava, yam, potatoes, cocoyam (roots) and maize, rice, guinea corn as cereals. Cash crops include oil palm and cashew.

Ninety six day old pullet chicks were procured and used in the experiment. The day old chicks were brooded using kerosene stove metal hovers and electric bulbs as source of light in a deep liter house. The birds were randomly allotted to five treatment diets after brooding for three weeks. There were 18 birds in some treatment and 19 birds in some treatments. Each treatment was replicated twice so that the treatment with 18 birds having 9 birds in each replicated and treatment with 19 birds having 9 birds in one replicated and 10 birds in the second replicate. Feeds and water were provided *ad libitum*.

Health management practice includes the administration of Vitalyte, Procol, Peneteryl, Keprocyl, Gomboro and Lasota vaccine, Antistress, Antibiotics and Vitamins Mineral supplements were administered during the period of brooding and rearing.

There were five dietary treatments in which bambaranut waste was incorporated at 0,13.70,27.70,41.50, and 55.20% levels. As the level of bambaranut waste in the diet increased, maize offal (Dusa) and soybean decreased. The diets were supplemented with blood meal, bone meal, fish meal, salt and premix.

The experimental design was completely randomized design (CRD). Parameter measured were weekly weight gained, feed intake, feed conversion ratio (FCR) and feed cost. Initial weights of pullet chicks were determined by weighing them per replicates after three weeks brooding when the experiment began. Weight gain was determined by subtracting initial live weight from the final live weight. Weekly feed intake was determined by subtracting final weight of feeds from the initial weight of feeds. Feed conversion ratio was determined as feed intake divided by weight gain while cost per kg weight gain was calculated as FCR X Cost/kg feed.

Blood samples were collected from five birds per treatment. The blood samples were collected from the jugular vein with the use new needles and syringes into labeled sample bottles. The blood samples were taking to Grimard Hospital, Anyigba immediately for analysis.

The following haematological parameters were determined as described by (Shalmetal, 1975); the packed cell volume (PCV), red blood cell (RBC), white blood cell count (WBC) haemoglobin (Hb), neutrophils, eosinophils and basophils.

Samples of feeds were analyzed using the standard method of the association of official analytical chemist. (AOAC, 2000) to determine the crude protein (CP), crude fibre (CF), dry matter (DM), Ether extract (EC) and ash. The analysis was done at the Biochemistry laboratory, Kogi State University, Anyigba.

Data collected were subjected to analysis of variance (ANOVA) and differences between treatment means were tested by using least significant difference (LSD) procedure as described by Snedocor and Cochran, (1974).

Table 1: Composition of Experimental Diets.

Ingredients	Treatments				
	T1	**T2**	**T3**	**T4**	**T5**
Soybean meal	26.10	19.60	13.60	6.60	0.00
Bambaranut Waste	0.00	13.70	27.70	41.50	55.20
Dusa	72.50	65.00	55.90	46.60	38.80
Blood Meal	0.00	0.30	1.80	4.10	4.60
Bone Meal	1.00	1.00	1.00	1.00	1.00
Salt	0.10	0.10	0.10	0.10	0.10
Premix	0.30	0.30	0.30	0.30	0.30
Total	100	100	100	100	100

RESULTS AND DISCUSSION

PROXIMATE COMPOSITION OF FEED INGREDIENTS AND BAMBARANUT WASTE

Proximate composition of BNW and Bambaranut waste are summarized in Table 2a and 2b

Table 2a: Proximate composition of BNW (%)

COMPONENTS	(%)
Moisture	8.48
Dry Matter	91.43
Crude Protein	20.34
Ether Extract	2.25
Ash	6.78
NFE	58.8

Table 2b: Proximate Composituion of Experimental Diets.

Ingredients	Treatments				
	T1	**T2**	**T3**	**T4**	**T5**
Crude Protein (%)	20.58	19.98	19.68	19.50	19.10
Crude Fibre (%)	4.76	6.25	6.93	8.26	10.55
Calcium	1.33	1.40	1.09	1.25	1.30
Phosphorus (%)	1.10	1.20	0.90	1.00	1.00
Energy Kcal/Kg	2756.96	2692.25	2593.2	2540	2434.4

The BNW used in this study had a crude protein content 20.34% as shown in Table 2a. This agreed with the value reported by Ezuoke (2003), Amaefule and Iroanya (2004), but higher than the value of 16.19% CP recorded by Amaefule and Osuagwu (2005). The crude fibre of 6.83% obtained for BNW in this study is comparable to 5.40% CF reported by Ezuoke (2003), Amaefule and Ironya (2004) but lower than 11.30% CF obtained by Amaefule and Osuagwu (2005). The value of other energy nutrients in BNW appeared to be insufficient compared with conventional feed ingredient. The BNW can however, be incorporated as source of energy and protein in the diet of broiler chicks similar to conventional feed ingredient, such as soybean meal and groundnut cake when combined with soybean, Dusa and blood meal to produce a good quality diet and at the same time reduce the cost of feeding

The result of the proximate analysis of the diets shows that crude fibre content increased with increase in level of BNW in the diet. This could be attributed to the high CF in BNW (16.83%). The diets were compounded at 20% crude protein content for pulled 0 to 8 weeks in line with Olomu, (1995). The energy values of the diets ranged between 2434.2 to 2756.92 Kcal/Kg

Table 3: Performance of pullet chicks fed varying levels of bambara waste diets

PARAMETERS	Treatments					
	T_1	T_z	T_3	T_4	T_5	SEM
Mean Initial Weight (Kg)	68.35	71.10	74.95	72.50	71.10	0.92
Mean Final Weight (Kg)	227.75^{c}	287.85^{a}	250.70^{b}	260.35^{b}	187.50^{d}	$13.81^{n.s}$
Total Weight Gain/Bird(g/day)	159.4^{c}	216.75^{a}	175.75^{b}	187.85^{b}	116.74^{d}	$12.77^{n.s}$
Daily Weight Gain/Bird(g/day)	5.70^{c}	7.74^{a}	6.28^{b}	6.71^{b}	4.16^{d}	$0.46^{n.s}$
Feed intake/Bird/Day (g)	33.45	39.70	36.40	32.54	38.52	$1.25^{n.s}$
Feed Conversion Ratio	6.02	5.15	5.84	4.95	10.10	$0.74^{n.s}$
Feed Cost/Kg (₦)	47.12^{a}	39.88^{b}	33.00^{c}	26.90^{d}	18.92^{c}	$18.63^{n.s}$
Feed Cost/Kg gain (₦)	7.51^{b}	8.64^{a}	5.79^{c}	40.50^{d}	2.20^{c}	0.35

a,b,c,d = Treatment means on the same row with different super script differ significantly (P<0.05)
SEM = Standard Error of Mean

There was significant (P<0.05) differences in the final, total and daily weight gain of the pullets. This was in agreement with the findings of Amaefule and Osuagwu, (2008) who observed significant (P<0.05) differences for all parameters measured. Daily feed intake did not show significant (P>0.05) difference. However, pullet chicks fed the control diet (0%) and the 41.50% BNW had lower feed consumption than those of the 13.70%, 27.70% and 55.20% BNW diets. This may have been due to diet composition (Acamovic, 2001) rather than nutrient deficiency (National Research Council, 1994). Feed conversion ratio improved steadily from 10.10 (T_5) to 6.02 (T_1) and were significant (P<0.05).

It could be seen that diets with (T_2) 13.70% and (T_3) 27.70% BNW tend to have higher weight gain compared to the other dietary level of BNW. Feed cost/Kg (₦) decreased steadily with increase in the dietary level of bambaranut waste in the diets from T_1 to T_5 and the treatment means were significant. The feed cost/Kg gain (₦) decreased steadily from T_1 (7.51) to T_5 (2.20) and were significantly (P<0.05) different.

Haematological indices

The effect of dietary BNW on the blood composition is shown in Table 4

Table 4: Haematological Parameters of Pullets fed varying levels of bambaranut waste diets.

Parameters	Treatments					
	T1	T2	T3	T4	T5	SEM
PCV (%)	29.33	43.00	67.00	34.00	36.33	1.838^{n-s}
Hb (g/L)	148.67	187.33	299	214	247	21.833^{n-s}
WBC (X10g/L)	7.60	8.79	9.57	12.14	10.7	0.749^{n-s}
RBC (X1012/L)	13.96	6.78	7.77	9.35	17.07	1.648^{n-s}
Eosinophil (%)	1.00	1.33	1.33	3.33	1.67	0.425^{n-s}
Neutrophil (%)	60.33^{ab}	35.00^{c}	35.67^{bc}	96.33^{a}	69.33^{b}	7.136*
Basophil (%)	0.67	0.33	0.33	0.33	0	0.122^{n-s}

a, b, c = Value on the same row with different superscripts are significantly (P < 0.05) different.
SEM = Standard Error of Mean

There was no significant (P>0.05) dietary effect of PCV, HB RBC, Eosinophil and basophil and the values did not show specific trend but the recorded values for these parameters were comparable with the values earlier reported by Annongu and Olawuyi, (2005) for pullet chicks and Abimbola, (2007) for broiler chicks. However, values obtained for neutrophil was significantly (P<0.05) affected by dietary BNW. Higher inclusion level of BNW affected neutrophil and heamoglobin. The value of neutrophil was higher in diets with 44.7% BNW and also, the value of haemoglobin increased with increase in level of BNW. This may partly be attributed to the increased utilization of BNW in the different dietary treatments. The values obtained in this study are comparable with the values in Annongu and Olawuyi, (2005). The significant effect of dietary treatments on neutrophil is note worthy with regards to its role in phagocytosis (killing and digestion of bacterial micro organism) and body defense against diseases. (Pagana and Pagana, 2005).

Conclusion

The result obtained indicated that BNW had no adverse effect on the performance characteristics of 6 weeks old pullets.

However, bambaranut waste (BNW) affect neutriphils of the pullet chicks but had no significant (P>0.05) effect on the other haematological indices considered. Bambaranut waste is safe in pullet's feeds even at 55% level of inclusion.

Bambaranut waste (BNW) can be included in diets of pullet chicks up to 50% level for optimum

performance and to reduce cost of production since BNW is relatively cheaper than other protein and energy sources.

Further research using other classes of poultry is suggested.

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