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Research paper

NOODLE WASTE AS REPLCEMENT FOR MAIZE IN THE DIET OF COCKEREL FINISHER CHICKEN

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ABSTRACT

The objective of this study was to determine the effect of replacing maize fraction of the diet of cockerel finisher chicken with rice noodle waste (NW) on feed intake, weight gain, cost benefits and blood indices such as Packed Cell Volume (PCV), White Blood Corpuscles (WBC), Red Blood Corpuscles (RBC), Total Protein, Albumin and Globulin. One hundred and twenty cockerel finisher chicken of mean weight of 689.01± 2.4g were randomly selected and allotted to 4 dietary treatments. Each treatment was replicated thrice with ten birds per replicate in a completely randomized design. Four diets were formulated to contain 0% (T_1), 50%(T_2), 75% (T_3), 100% (T_4) of NW as replacement for maize fraction of the entire diet. Parameters measured or calculated were weight gain, feed intake, feed conversion ratio, total feed cost, and cost per weight gain, dressing percentages and blood indices such as packed cell volume (PCV), Red blood cell count (RBC)and White blood cell(WBC) and total protein etc. Significant differences were observed in the mean total feed intake of the birds fed diet containing 0% and 100% NW as replacement for maize ($P>0.05$). The mean total weight gain of birds fed diet containing 100% NW and the control diet were significantly influenced by the dietary treatments ($P<0.05$). The feed conversion ratios were relatively similar ($P>0.05$) in diet containing 0% and 100% NW as replacement for maize. The dietary treatments had no significant effect on the PCV, RBC and WBC and blood total protein ($P>0.05$). The lowest cost/weight gain was recorded in the diet containing 100% NW as replacement for maize. Based on the present results NW could replace maize fraction of the diet partially or wholly without any adverse effect on performance and health status but at reduced cost.

Keywords: Cockerel, cost/weight gain, feed efficiency, rice noodle waste, Packed cell volume

INTRODUCTION

The animal protein intake of average Nigerian is low when compared to reports obtainable from Developed Nations of the world such as Great Britain, United States of America, Italy and Japan and this could be attributed to inadequate supply and high cost of animal sources of protein such as beef, pork and poultry products etc (1,2,3). There is need to improve livestock industries in Nigeria in order to meet the demand for meat and other livestock products. Availability of feed at affordable price constitutes a major limitation to the expansion of poultry and other livestock industries in the country (4,5,6). Conventional feed ingredients such as maize, soybean meal, groundnut cake meal and bone meal are expensive because of industrial uses and human consumption, hence the use of alternative feed resources must be encouraged in order to reduce feed cost which constitutes up to 60 – 70% of total cost of production. Noodle waste is one of the sources of energy in the diet of livestock. According to (6) the protein content is about 9.56% with high metabolizable energy. The fat content is higher than that of maize. Moreover, the cost

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of noodle waste (NW) is relatively cheaper than the cost of maize of the same quantity. It concluded that maize could be partially replaced with NW without adverse effect on growth, egg and carcass quality of laying chicken (6). This study was designed to evaluate performance characteristics, carcass values, cost benefits and haematological indices of cockerel at growing – finishing phase.

MATERIALS AND METHOD

A total of one hundred and twenty 8 weeks cockerel chickens (Harco black) of mean weight 689.01± 2.4g were used for the feeding trial. Four diets, T_1, T_2, T_3 and T_4 were formulated to contain 0, 50, 75 and 100% noodle waste as replacement for maize in a growing – finishing cockerel diet respectively. Noodle waste (NW) was purchased from a feed mill in Ibadan, Oyo state, Nigeria, it was ground before incorporating with other feed ingredients. The diets were formulated to contain about 16% crude protein and energy of about 2800Kcal/kg ME (Table l). Thirty (30) birds each were randomly allotted to each of the treatment in a completely randomized design and each treatment was replicated thrice with 10 birds per replicate. Feed and water were given *ad libitum*. Daily Feed intake was calculated by deducting the left over feed from a weighed quantity of feed supplied daily. The birds were weighed at weekly intervals to determine the weekly and subsequently the daily weight gain. Feed conversion ratio (FCR) was calculated as the ratio of feed intake to weight gain. Record on mortality were also taken. The feed cost and cost per weight gain were calculated. The prevailing market prices of the feed ingredients at Ibadan, Oyo State, Nigeria where the feed ingredients were purchased at the time of study were used to calculate the feed cost/kg feed and the cost of the feed to produce a unit weight (₦/kg weight gain). At the end of the 10th week, blood samples were collected from 6 birds in each experimental group (i.e. 2 birds per replicate) for the determination of the haematological and serum biochemical parameters. The birds randomly selected were fasted from 6.00 pm to 6.00 am and bled early in the morning to avoid temporary elevation of blood metabolites by feeding. Approximately 5ml of blood was collected from jugular vein of chickens into two sets of sterilized glass bottles containing ethylene diaminetetra-acetic acid (EDTA) for haematology and without anticoagulant for serum separation. Samples for haematological study were collected into sample tubes containing heparin as anticoagulant while serological samples were collected into sample tubes containing no heparin. Serum was obtained after the blood was allowed to stand for 2 h at room temperature and centrifuged at 2,000 revolutions per minute (r.p.m) for 10 minutes to separate the cells from the serum. Haematological parameters included the packed cell volume (PCV), red blood cells (RBC), haemoglobin concentration (Hb), white blood cells (WBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCV), and mean corpuscular haemoglobin concentration (MCVC). Total protein, albumin, globulin, and creatine formed the biochemical data were determined (7,8). Blood samples were analyzed for haematological parameters according to routinely available clinical methods (9). The chemical composition of the test ingredient, experimental diets were carried out according to the method of (10). All data were subjected to statistical analysis of variance and means were separated by Duncan multiple range test (11

Results and Discussion

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The crude protein of noodle waste and maize were relatively similar (Table 2) which was in agreement with the findings of (6). The crude protein content of about 16% of the experimental diets was relatively similar to the report of (12,13). Significant differences were observed in the mean total feed intake of the birds fed diet containing 0% and 100% NW as replacement for maize (P>0.05) (Table 3). The highest feed intake was recorded in T_4. There was no significant difference in the mean total feed intake in T_1, T_2 and T_3 (P>0.05). Good taste and high protein content of the test ingredient would have been responsible for improvement in numerical increased feed intake. The improvement in feed intake from T_1 to T_4 could also be due to decrease in the caloric level as the level of noodle waste increased in the diet from 0% to 100% and the report was in agreement with the findings of (3,6). The mean total weight gain of birds fed diet containing 100% NW and the control diet were significantly influenced by the dietary treatments (P<0.05). Birds in the control diet had significantly higher weight than those in T_4 (P<0.05). The feed conversion ratio was relatively similar (P>0.05) in diet containing 0% , 50, 75 and 100% NW as replacement for maize. The relative similarity in performance observed in the birds fed control diet and those fed 100% NW as replacement for maize implied that maize could be replaced partially or wholly by NW in the diet cockerel finisher chicken without affecting the growth and feed efficiency. The low mortality recorded in all the treatments is an indicative of the fact that noodle waste could be used as substitute for maize without any adverse effect on the health status of the birds. The cost per kg feed and total feed cost reduced as the level of NW in the diet increased from T_1 to T_4. The lowest cost/kg feed of ₦159.25 was recorded in diet containing 100% of noodle waste as replacement for maize while the highest cost per weight gain of ₦166.15 was recorded in T_1 (Table 3). The mean dressing percentage in all the treatments were relatively the same as shown in Table 4. The values ranged between 72.88% and 73.41%. the values recorded in this experiment was similar to the report of (12,13). The heart, lung and liver weight were not affected by the inclusion of noodle as replacement for maize (Table 4). There was no depressive effect of NW on PCV as the level increased from 0 – 100% as replacement for maize in the diet (P>0.05). The PCV values fell within the recommended values according to (14). The haemoglobin concentration of the birds was not significantly affected by the dietary inclusion levelof NW in the diet of growing – finishing cockerel. The values of haemoglobin count ranged between 11.33 and 11.44% (P>0.05) and this indicates that the Oxygen carrying capacity of the bird's blood by haemoglobin was relatively the same. The while blood cell counts was relatively the same across the treatments and the values obtained were in agreement with the recommended values (8,15). 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 and 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 (8,14,16). The results obtained in the study also buttress the fact that NW had no detrimental effect on health status of the birds and could be used as alternative feed resource in the diet of broiler starter chicken.. The results of serum biochemical values presented shows that the total protein, albumin and globulin of the birds in all the treatments were not significantly influenced by the inclusion of NW in the diets (P>0.05). Numerically, birds fed diet 4 had slight higher total protein and albumin levels than those fed 0, 50 and 75%NW as replacement for maize and this could be due to high inclusion levels of NW and the report is in agreement with the findings of (17) who reported that total protein contents of the blood depend on the quantity and quality of

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the protein supplied in the diet. Based on the present results of, feed conversion ratio, dressing percentages, cost per weight gain and blood indices, noodle waste could replace maize fraction of the diet partially or wholly without any adverse effect on health status but at reduced cost.

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Table 1: Gross composition of the experimental diets

Ingredients (%)	Cost (N/kg)	T_1	T_2	T_3	T_4
Maize	62.00	40	20	10	0.0
RNPW	50.50	0	20	30	40
Total		100	100	100	100
Cost/kg (N)		53.15	52.12	50.76	49.05
Calculated Composition					
Crude protein (%)		15.68	15.90	16.21	16.35
Energy (Kcal ME/kg)		2836.2	2810.34	2798.34	2768.34

*Others fixed ingredients: G.N.C. – 10.0; Soybean meal -9.2; Corn-bran -25.3; Wheat offal- 8.0, Fish meal -2; Bone meal -1.5; Oyster shell – 3.5; Methionine - 0.1; Lysine - 0.1; Premix 0.25; Salt-0.25.

ME**: Metabolizable Energy calculated according to Pauzenga (1985) as ME (Kcal/kg) = 37 X % CP + 81 X % EE + 35.5 X % NFE.

* Vitamin – Mineral Premix (BIO – MIX) Supply the following per Kg: Vitamin. A 5000Iμ; Vit. D3, 888, 000IU; Vit. E, 12,000mg; Vit. K3; 1500mg; Vit. B1, 1000mg; Vit. B2, 2000mg; Vit. B6, 1600mg; Niacin, 12,000mg; Pantothenic acid, 2000mg; Biotin, 1000mg; Vit.B12, 3000mg; folic acid, 15000mg; Choline Chloride, 60,000mg; Manganese, 10,000mg; Iron, 15000mg;Zinc, 800mg; Copper, 400mg; Iodine, 80mg; cobalt, 40mg; Selenium, 8000mg.

Table 2 : Determined Proximate Composition of Maize, Noodle waste and Experimental diets

Parameters	Maize	Noodle waste	T_1	T_2	T_3	T_4
Dry matter	93.78	92.74	95.96	94.67	94.87	95.45
Crude protein	9.89	10.02	15.56	15.59	15.69	15.76
Crude fibre	5.76	4.58	5.97	5.87	5.81	5.64
Ether extract	6.78	8.34	4.98	5.58	5.99	6.98
Ash	11.89	12.24	11.23	11.55	11.69	11.99

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Nitrogen free extract	65.68	64.82	62.26	61.41	60.82	59.63

Table 3: Summary of performance characteristics and cost benefits of cockerel finishers chicken fed NW meal based diet as replacement for maize.

Variables (Means)	T_1	T_2	T_3	T_4	± SEM
Initial weight. (g)	689.41	687.92	691.44	688.73	5.89
Final weight. (g)	2905.6 [a]	2907.4 [a]	2894.5 [a]	2884.3 [b]	7.45
Weight gain (g)	2216.19 [a]	2219.48 [a]	2213.06 [a]	2195.57 [b]	7.12
Total feed intake (g)	6936.68 [a]	6946.97 [a]	6949.0 [a]	7135.60 [b]	15.15
Mortality/bird	3.33	0.00	3.33	3.33	
Feed conversion ratio	3.13	3.13	3.14	3.25	0.23
Cost/kg feed (₦ /kg)	53.15 [a]	52.12 [a]	50.76 [ab]	49.05 [b]	2.05
Total feed cost (₦ /kg)	368.86 [a]	362.23 [b]	352.78 [c]	349.73 [c]	4.78
Cost/wt. gain (₦ /kg)	166.15 [a]	163.16 [ab]	159.62 [b]	159.25 [b]	3.05

Means with different superscripts along the same row are significantly different (P<0.05).

Table 4: Carcass composition of cockerel finishers chicken fed NW meal based diet as replacement for maize.

Variables (Means)	T_1	T_2	T_3	T_4	± SEM
Live weight (g)	2901.6 [a]	2903.4	2891.3 [a]	2876.3 [b]	6.21
Eviscerated weight(g)	2130.07 [a]	2131.68 [a]	2108.9 [b]	2096.2 [b]	11.89
Dressing percent (%)	73.41	73.42	72.94	72.88	3.43
Heart weight (%)	0.65	0.64	0.65	0.63	0.11
Liver weight (%)	2.68	2.65	2.68	2.62	0.23
Lung weight (%)	1.79	1.76	1.77	1.75	0.13

Means with different superscripts along the same row are significantly different (P<0.05).

Table 5 Haematology parameters of cockerel finishers chicken fed NW meal based diet as replacement for maize.

Variables (Means)	T_1	T_2	T_3	T_4	± SEM
PCV (%)	27.69	28.45	28.91	27.89	2.23
R.BC(x 10^6/µ1)	4.21	4.20	4.24	4.33	0.67
Haemoglobin (g/dl)	11.35	11.33	11.43	11.44	1.43
WBC (x 10^3/µ1)	11.98	11.98	11.86	12.01	1.76
MCHC%	32.46	32.32	32.45	33.01	2.43
Neutrophil %	34.67b	35.43	34.97	34.88	3.12
Monocyte%	0.41	0.41	0.43	0.45	0.11
Eosinophil	0.14	0.13	0.13	0.15	0.05

Means along rows with different superscript are significantly different from each other (P<0.05)

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Table 6 Serum biochemical parameters of cockerel finishers chicken fed NW meal based diet as replacement for maize.

Parameters (Means)	T_1	T_2	T_3	T_4	± SEM
Total protein (g/dl)	5.58 [b]	5.59	5.61	5.77	0.68
Globulin (g/dl)	3.34	3.36	2.37	3.42	0.36
Glucose Mg/dl)	156.8	158.23	160.3	161.34	6.34
Albumin g/dl	2.61	2.63	2.65	2.70	0.12
Creatine Mg/dl	1.21	1.23	1.30	1.33	0.05

Means along rows with different superscript are significantly different from each other ($P<0.05$)