PERFORMANCE AND SERUM METABOLITES OF BROILERS FED VARIED LEVEL OF CASSAVA PEEL MEAL ENRICHED WITH METHIONINE AND ENZYME

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ABSTRACT
The high dietary fibre and low energy density of cassava peel have limited the full utilization by broiler chicken. Supplementation of cassava peel with enzymes and methionine improve broilers performance. Performance and serum metabolites of broilers fed varied level of cassava peel meal (CPM) enriched with methionine and enzyme was studied. A total of 96 broiler chickens were used in the research work. The birds were randomly allotted to four experimental treatment with each treatment having four replicate of eight birds per replicate. A completely randomized design (CRD) was employed. Four experimental diets were compounded to include CPM at 0, 15, 30 and 45% maize replacement in diets designated as T1, T2, T3 and T4. Performance and serum metabolites parameters of broilers fed were determined. Observed results show no significant differences (P>0.05) in initial weight and feed conversion ratio (FCR). However, there were significant variations (P<0.05) in final weight, weight gain, daily weight gain and daily feed intake in the performance parameters. A significant difference (P<0.05) was observed for total protein, albumin, creatinine and cholesterol. A non-significant difference (P>0.05) was observed for globuline, aspartate amino transferase and alanine amino transferase. Values of the total protein was significantly different (P<0.05). However, no significant variation were observed for the values obtained in the birds fed diets T1, T2 and T3, except for cholesterol which were significantly reduced with CPM inclusion. It was concluded that CPM be included up to 30% replacement for maize in the diets of finisher broilers chickens.

Keywords: Broiler Chicken, Cassava Peel Meal, Performance, Serum Metabolites, Methionine-Enzymes

INTRODUCTION

The high cost of compounded feed for poultry is derived largely from the exorbitant prices of feed ingredients occasioned by increasing competitive demand for them by man and animals, as well as scarcity of conventional ingredients such as maize, sorghum, groundnut cake, soybean and fish meal (Apata and Ojo, 2000). This competition between human and animals has brought about limited availability of maize, thus increasing the price and scarcity. This has necessitated research into non-conventional energy ingredients that would replace maize without compromising the growth efficiency, blood parameters and carcass quality of the birds (Onunkwo and Ugwuene, 2015). Traditionally in most researches conducted on poultry feeding with non-conventional feedstuffs, high dietary fibre is associated with negative connotation in relation to voluntary and nutrient digestibility (Mateos *et al.,* 2002). One of such non-conventional feedstuffs is cassava peel. The high fibre and low energy density, low protein content, dustiness and likely presence of hydrocyanic acid (HCN) have limited the full utilisation of cassava peel in monogastric feeding (Ravindran, 1991). However supplementation with fat reduces the dustiness and boosts the energy levels of cassava peel meal based diets (Oke, 1978) and enzyme incorporation in the improvement and the utilisation of its dietary fibre by poultry (Tabook *et al*, 2006; Sundu *et al*, 2009) have been reported. Oladunjoye *et al*. (2014) reported significant improvement on broilers performance characteristics with use of methionine at 0.4% with 20% CPM inclusion. Thanh-Hang *et al*. (2009) reported that cyanide can be detoxified to thiocyanate by the enzyme rhodanase making use of methionine. Therefore, this study was to evaluate the performance and serum biochemical profile of broiler chicken fed varied level of cassava peel meal enriched with methionine and enzyme.

MATERIALS AND METHODS

The study was conducted at the Poultry Unit of the Teaching and Research Farm of Prince Abubakar Audu University, Anyigba Kogi State. Four experimental diets were compounded, in which cassava peel meal enriched with enzymes and methionine as replacement of maize was incorporated at 0%, 15%, 30%, and 45% of maize-base in T1, T2, T3, and T4, respectively, where T1 serves as the control. A total of 96 unsexed day-old broiler chicks were purchased from a reputable poultry farm that were used for the feeding trial. The birds were allotted in a Completely Randomized Design (CRD) into four (4) experimental treatments. Each treatment had three replicates of eight (broiler chicks per replicate. The feeding trial lasted for twenty-eight days after the initial brooding period of twenty eight days when the birds were fed on a commercially purchased common diet. Vaccination and medication were provided, with feed and water given *ad-libitum*. Subsequently, data were collected for performance and serum metabolites. Data were subjected to one-way analysis of variance (ANOVA) and means that were significantly different were separated by Least Significant Difference using SPSS window version 16.

RESULTS AND DISCUSSION

The analyzed results of the effect of feeding cassava peel meal enriched with methionine and enzyme on the performance of finisher broilers is presented in Table 1. Observed results show no significant differences ($P>0.05$) in initial weight and feed conversion ratio (FCR). However, there were significant differences ($P<0.05$) in final weight, weight gain, daily weight gain and daily feed intake. Final weight showed significant decrease in values with increase in the inclusion level of %CPM. However, the final weight value (1970.09-2110.15g) does not corroborate with the findings of Sogunle *et al.* (2009), who recorded final weight values of 1.42kg to 1.71kg when CPM based diet were fed to broilers. Significant reduction in feed at the 45%CPM inclusion could be attributed to the high content of palm oil in the diets which likely increased energy level of the diets. This observation agrees with the reports of Osei (1992) and Oruwari *et al*. (1996), which indicated that feed intake decreased with increase in energy level. Akinfala *et al*. (2002) and Aderemi *et al*. (2006) confirm the scientific evidence that birds eat to satisfy their energy requirement. However, birds fed 45%CPM supplement were observably smaller in size (1970.09g) as compared to the control group therefore less feed was required for meeting their metabolic processes. This is in synchrony with Pinchasov and Gallili 1990 who reported that the body nutrient requirement of commercial bird is proportional to their body weight. The feed conversion ratio of birds were not significantly affected by the dietary treatments. This implied a steady drop in utilization of the experimental diet even though variation is not significant.

Table 1: Performance Characteristics of finisher Broilers Fed CPM Based Diets

Parameters	T1	T2	T3	T4	SEM	LOS
Initial body weight (g)	797.17	799.91	798.52	798.84	3.94	NS
Final body weight (g)	2110.15^{a}	2094.94^{a}	2061.32^{a}	1970.09^{b}	50.27	*
Body Weight gain (g)	1312.98^{a}	1295.03^{a}	1262.80^{a}	1171.25^{b}	44.96	*
Daily body weight gain(g)	46.89^{a}	46.25^{a}	45.10^{a}	41.83^{b}	1.41	*
Daily feed intake (g)	120.72^{a}	119.69^{a}	118.27^{a}	110.23^{b}	3.77	*
Feed conversion ratio	2.57	2.59	2.62	2.64	0.38	NS

abc Means with different superscript along the same rows show significant difference at $p>0.05$, CPM= cassava peel meal, T1(control, No CPM-Methionine supplementation); T2(15% CPM-Methionine supplemented); T3(30% CPM-Methionine supplemented); T4(45% CPM-Methionine supplemented); SEM= Standard Error of the Mean. NS= Not significant, LOS= level of significant

The effect of feeding cassava peel meal enriched with methionine and enzyme on the serum biochemical indices of finisher broilers is presented in Table 2. A significant difference ($P<0.05$) was observed for total protein, albumin, creatinine and cholesterol. A non-significant difference ($P>0.05$) was observed for globuline, aspartate amino transferase and alanine amino transferase. Higher serum total protein could imply better growth performance as it proves effective assimilation and utilization of the protein content of the experimental diet by the broiler chicken (Mateos *et al*., 2012). Globulin and albumin are very essential indications to blood protein with immunity improving quality (Kamal, 2014). This implies that the higher the globulin level the higher the chance of quick recovery and fast

growth among broiler chickens. The globulin values obtained increased with increased in the %CPM inclusion level. Values obtained were however within reference value range of 1.50g/dL to 3.00g/dL as indicated by Durotoye *et al.* (2003) for broiler chickens. Consumption of CPM in the diets at varying levels increased the concentration of creatinine in the birds from 69.74mg/dl to 73.10mg/dL. Creatinine is an indirect measure of protein utilization in poultry birds. The significant ($P<0.05$) Values (111.96g/dL – 123.70g/dL) obtained were within the normal range of 110.00g/dl – 140.00 mg/dl reported by Adeyemo and Sani (2013) when broilers were fed *Aspergillus niger* hydrolyzed CPM based diet. The high level of serum cholesterol level may be attributed to either the higher ether extract present with increase in CPM or absorption level of intestinal cholesterol by dietary fibre present in the diet and rapid excretion or a more specific effect of other components of the fibre present in the CPM (Moharrery and Mohammadpour, 2005).

Table 2: Serum Biochemical Indices of Finisher Broilers Fed Diets Containing Varying Levels of CPM as Replacement for Maize

Parameters	T1	T2	T3	T4	SEM	LOS
Total Protein (g/dL)	4.21[a]	4.19[a]	4.18[a]	3.80[b]	0.12	*
Albumin (g/dL)	2.68[a]	2.62[a]	2.57[a]	2.19[b]	0.19	*
Globulin (g/dL)	1.53	1.57	1.61	1.61	0.46	NS
Creatinine (mg/dL)	69.74[a]	70.00[a]	69.96[a]	73.10[b]	1.09	*
AST (µ/dL)	65.33	65.07	66.11	65.49	1.37	NS
ALT (µ/dL)	12.80	12.00	12.36	11.97	1.19	NS
Cholesterol (mg/dL)	111.96[a]	112.31[b]	114.74[b]	123.70[b]	2.53	*

[abc] Means with different superscript along the same rows show significant difference at $p>0.05$; CPM= cassava peel meal; T1(control, No CPM-Methionine supplementation); T2(15% CPM-Methionine supplemented); T3(30% CPM-Methionine supplemented); T4(45% CPM-Methionine supplemented); SEM= Standard Error of Mean; NS= Not significant; LOS= level of significant; AST= Aspartate aminotransferase; ALT= Alanine aminotransfarase

CONCLUSION

This study showed that cassava peel meal (CPM) enriched with methionine and enzyme had the potential to improve the final weight, weight gain, daily weight gain, daily feed intake, total protein, albumin, creatinine and cholesterol concentration without posing any adverse effects on the performance and serum metabolites of broiler finisher up to 30%CPM inclusion. Though cassava peel meal contained low quality protein with an unbalance amino acids profile. With increase in the quantity of cassava peel meal, protein quantity and quality of amino acid tends to reduced growth performance with increase in the CPM levels.

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