International Journal of Sustainable Agriculture 3 (1): 01-04, 2011
ISSN 2079-2107

Performance of Broiler Chicken Fed Enzyme Supplemented Cassava Peel Meal Based Diets

[1]A. Midau, [1]C. Augustine, [2]B. Yakubu, [2]S.M. Yahaya, [3]A. Kibon and [2]A.O. Udoyong

[1]Department of Animal Production Adamawa State University Mubi, PMB 25, Nigeria
[2]Department of Animal Science and Range Management, Federal University of Technology Yola, Nigeria
[3]Department of Animal Science University of Maiduguri, Nigeria

Abstracts: Eight weeks experiment was conducted to investigate the performance of broiler chicken fed varying levels of enzymes supplemented cassava peel meal (CPM) and its cost benefit. Five experimental diets for broiler starter and finisher diets were formulated in which enzyme supplemented cassava peel meal replace maize at 0, 25, 50, 75 and 100%. One hundred and twenty (120) Anak broiler chicks were randomly allotted to five dietary treatments in a completely randomized design with three replicates containing eight birds. The results of feed intake, feed conversion ratio and daily weight gain however, showed significant difference. Numerical means of the treatment showed slight variation when compared to the control diets. Mortality of 6.66% was recorded during the experimental period. Feed cost per kilogram of feed, cost of feed per kilogram gained also decreases with increasing levels of enzyme supplemented CPM.

Key words: Broiler % Performance % Enzyme supplemented % Cassava peel meal

INTRODUCTION

The prices of energy source for livestock feed have been on the increase in Nigeria. The chief source of energy is maize. But, maize is also required by humans and processing industries. Maize proportion in monogastric diets ranges from 50 - 70% which implies that increasing cost of maize is being currently experienced due to low level of production which invariably leads to increase cost of conventional animal feeds [1].

The seasonality and cost of conventional feedstuffs are such that some degree of supplementary feeding and alternative energy source is required [2]. One of such alternatives for potential replacement of maize in animals feed is the use of processed cassava peel meal (CPM).

Cassava peel is a major by-products of cassava tuber roots processing industry. It is the outer cover of the tuber root which is usually removed manually with sharp knife [3]. These peels are regarded as waste and are usually discarded and allow rotting. The future utilization of cassava peels depends very much upon the development of improved processing technologies and improved products that can meet the changing needs of poultry farmers and on its suitability for alternative uses as animal feeds.

The use of enzyme supplementation is one of the important techniques for enhancing the efficiency of feed utilization in monogastric nutrition. This research was designed to determine whether enzyme supplementation can improve the nutritive value of cassava peels and also to determine the performance of broilers fed diets containing varying levels of enzyme supplemented cassava peel meal.

MATERIALS AND METHODS

Location of the Study Area: The research was conducted at the Federal University of Technology Teaching and Research farm located in Yola Adamawa state. The area lies within the latitude 9.11° north and longitude 12.28° east. It has minimum and maximum rainfall of 750-1050mm and average minimum and maximum temperatures of 15°C and 32°C [4].

Experimental Diets and Treatments: Five experimental diets were formulated. The diets contain graded levels of enzyme supplemented cassava peel meal (CPM) to replace maize at 25, 50, 75 and 100% respectively. Diets two (2) to five (5) contain graded levels of enzyme supplemented cassava peel meal. Diet one had zero (0%) replacement and served as the control. The compositions of the experimental diets are presented in Tables 1 and 2.

Corresponding Author: C. Augustine, Department of Animal Production Adamawa State University Mubi, PMB 25, Nigeria
E-mail: augustine.clement@yahoo.com

Table 1: Composition of starter diets (kg/100kg)

Ingredients	T1 0% CPM	T2 25% CPM	T3 50% CPM	T4 75% CPM	T5 100%
Cassava peel	00.00	12.00	24.00	36.00	48.00
Maize	48.00	36.00	24.00	12.00	00.00
Groundnuts cake	31.70	31.70	32.70	32.70	32.70
Wheat offal	13.00	12.00	11.00	9.00	8.00
Fish meal	3.00	4.00	5.00	6.00	7.00
Borne meal	2.50	2.50	2.50	2.50	2.50
Limestone	1.00	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25	0.25
Premix+	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20	0.20
Enzyme	00.00	++	++	++	++
Total	100.00	100.00	100.00	100.00	100.00
Cal. Analysis					
Crude protein%	23.23	23.01	23.24	22.85	22.64
M/E (kcal/kg)	2814.01	2657.66	2526.68	2351.20	2194.42
Crude fibre	5.99	7.99	10.44	11.78	13.17

+ Supreme vitamin-mineral premix contains per 2.5kg the following: Vitamin A, 15,000,000 i.u; vitamin D3, 3,000,000 i.u, vitamin E,30,000 i.u, vitamin K, 2,500 mgr; Thiamine, B1, 2,000 mgr; Riboflavin, B2, 6,000 mgr; Pyridoxine B6, 4,000 mg; Niacin, 40,000 mgr; vitamin B12, 20mgr; Pantothenic Acid, 10,000 mgr; Folic Acid, 1,000mgr; Biotin, 80mgr; Choline Chloride 500mgr; Antioxidant, 125gr; Manganese 96gr; Zinc, 60gr; Iron, 24gr; Copper, 6gr, Iodine, 1.4gr; Selenium, 240mgr and Cobalt, 120gr

Table 2: Composition of finisher diet (kg/100kg)

Ingredients	T1 0% CPM	T2 25% CPM	T3 50% CPM	T4 75% CPM	T5 100%CPM
Cassava peel	00.00	13.50	27.00	40.50	54.00
Maize	54.00	40.50	27.00	13.50	00.00
Groundnuts cake	24.00	24.60	25.00	26.00	26.00
Wheat offal	15.60	14.00	12.60	10.60	9.00
Fish meal	2.00	3.00	4.00	5.00	6.60
Borne meal	2.50	2.50	2.50	2.50	2.50
Limestone	1.00	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25	0.25
Premix+	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20	0.20
Enzyme	00.00	++	++	++	++
Total	100.00	100.00	100.00	100.00	100.00
Cal. Analysis					
Crude protein%	20.15	20.20	20.27	19.80	19.78
M/E (kcal/kg)	2836.88	2663.63	2489.16	2319.30	2147.47
Crude fibre	5.41	7.60	9.78	11.99	14.70

+ Supreme vitamin-mineral premix contains per 2.5kg the following: Vitamin A, 15,000,000 i.u; vitamin D3, 3,000,000 i.u, vitamin E,30,000 i.u, vitamin K, 2,500 mgr; Thiamine, B1, 2,000 mgr; Riboflavin, B2, 6,000 mgr; Pyridoxine B6, 4,000 mg; Niacin, 40,000 mgr; vitamin B12, 20mgr; Pantothenic Acid, 10,000 mgr; Folic Acid, 1,000mgr; Biotin, 80mgr; Choline Chloride 500mgr; Antioxidant, 125gr; Manganese 96gr; Zinc, 60gr; Iron, 24gr; Copper, 6gr, Iodine, 1.4gr; Selenium, 240mgr and Cobalt, 120gr.

++ Maxigrain enzyme at 100g per one tone of feed

Experimental Design and Management: One hundred and twenty (120) one day old broiler chicks were randomly allotted to five (5) dietary treatments in a completely randomized design and were replicated three times with eight birds per replicate. The birds were reared on deep litter. The usual conventional brooding practices and poultry management were observed during the experimental period. Routine vaccination schedule was properly observed and the health of birds was well taken care of. Feed intake body weight change, feed conversion ratio and mortality were recorded respectively.

Chemical Analysis: Proximate analysis of the experimental diets was determined using the procedure described by Association of Analytical Chemists [5].

Statistical Analysis: Data obtained were analyzed using the analysis of variance of the completely randomized design and least significant difference was used to separate the treatment means.

RESULT AND DISCUSSION

The result of the performance of broiler chicken fed varying levels of enzyme supplemented cassava peel meal at both phases of growth are presented in Tables 3 and 4 while proximate compositions of the cassava peel meal and the experimental diets are presented in Tables 5 and 6.

The result of feed intake showed a significant difference ($P<0.05$) at both phases of growth. Observed numerical values however revealed slight differences among treatments when compared to the control. This is an indication that the enzyme used has reduced the anti nutritional effect of hydrocyanic acid as reported by White, *et al.* [6]. Enzyme addition is also believed to improve digestibility hence reduce physical bulk resulting to increase in feed intake.

The result of feed conversion ratio revealed significant variation ($P<0.05$) among the treatment means. The enzyme supplemented diets compete favorably with the control diet. This may be due to the fact that addition of enzyme has improved the digestibility and absorption o f nutrients. This is in agreement with the report of Han, [7, 8] and Vander, *et al.* [9]. Peng *et al.* [10] reported that xylase and phytase supplementation alone has improved overall feed utilization efficiency by 3.88 and 2.43%, respectively.

The results of daily weight gain showed a similar trend as it was in the feed conversion ratio. It is also believed that addition of enzyme has improved the overall feed utilization resulting to increase in weight gain. Mortality rate of 6.66% was recorded throughout the experimental period. This lower mortality rate is an indication that the test diets have little or no deleterious effect on the broilers.

Economic Analysis: The result of economic analysis of the experimental diets is presented in Table 8. The result revealed that there was significant reduction in the cost

Table 3: Proximate Composition of Cassava peel meal

Nutrients (%)	Cassava Peel
Dry matter	82.55
Crude protein	5.46
Crude fibre	18.81
Ether extract	1.75
N.E.E	70.67
Aash	5.68

Table 4: Performance broiler fed maize and enzyme supplemented CPM (1-4 weeks)

Parameters	T1 0% CPM	T2 25% CPM	T3 50% CPM	T4 75% CPM	T5 100% CPM	SEM
Feed intake (g/d/b)	47.00^{a}	47.07^{a}	47.05^{a}	47.85^{b}	48.03^{b}	0.76
Bodyweight (g/d/b)	26.60^{b}	26.33^{b}	26.53^{b}	23.97^{a}	23.83^{a}	1.64
FCR	1.77^{a}	1.79^{a}	1.77^{a}	1.99^{b}	2.02^{b}	1.33
Mortality	0.00	1.00	0.00	1.00	2.00	

a,b,c means with different superscript are significantly different ($P<0.05$)

Table 5: Performance of birds fed maize and enzyme supplemented CPM (5-8 weeks)

Parameters	T1 0% CPM	T2 25% CPM	T3 50% CPM	T4 75% CPM	T5 100% CPM	SEM
Feed intake (g/d/b)	102.73^{c}	103.33^{c}	103.29^{c}	98.31^{b}	97.63^{a}	0.21
Body weight (g/d/b)	34.50^{b}	33.43^{b}	34.30^{b}	20.17^{a}	18.80^{a}	0.58
FCR	2.98^{a}	3.09^{a}	3.02^{a}	4.87^{b}	5.20^{c}	0.74
Mortality	2.00	2.00	0.00	2.00	2.00	

a,b,c means with different superscript are significantly different ($P<0.05$)

Table 6: Proximate Composition of Experimental Starter Diet

Nutrients	1	2	3	4	5
Lipid (fats)	7.05	6.45	5.98	6.57	7.20
Crude Protein	21.62	22.36	23.14	21.57	21.01
Crude fibre	14.92	0.24	8.48	11.01	13.24
Total Ash	9.34	8.37	7.97	10.42	12.50
M.E (Kcal/kg)	2864.81	2910.48	2863.45	2812.73	2784.95
Calcium	1.88	1.64	1.75	1.52	1.50
Phosphorus	0.46	0.52	0.49	0.50	0.47

Table 7: Proximate composition of Experimental Finisher Diets

Nutrients	1	2	3	4	5
Lipid (fats)	6.85	6.35	5.88	6.45	6.55
Crude Protein	19.62	20.57	21.96	20.30	19.77
Crude fibre	15.53	12.07	10.94	12.11	13.94
Total Ash	8.64	8.07	7.26	9.12	11.05
M.E (Kcal/kg)	2894.57	2994.84	2945.43	2875.61	2863.21
Calcium	1.54	1.33	1.50	1.31	1.30
Phosphorus	0.41	0.45	0.46	0.45	0.41

Table 8: Economic Analysis of Enzyme Supplemented Cassava peel Meal

	Treatment				
	1	2	3	4	5
Starter Phase					
Cost of feed (₦/ kg)	42.27	36.56	33.66	28.99	24.91
Cost of feed/ kg weight gain	74.61	65.38	59.71	57.89	50.23
Finisher Phase					
Cost of feed (₦/ kg)	40.04	35.36	30.59	25.59	21.41
Cost of feed/ kg weight gain	119.29	109.29	92.35	164.22	137.73

of feed per kilogram and cost of feed per kilogram gain. It is very clear from the result that cost decreases with increasing level of enzyme supplemented cassava peel meal.

In conclusion, the result of the study however revealed that cassava peel meal can be made a better feed stuff by improving the digestibility of the high fibre component CPM and degrade its anti nutritional effect by supplementing with enzyme. It is clear that the test diets compete favourably with the control diets in all parameters, however supplementing cassava peel meal with maxigrain enzyme at 50% inclusion level gave the best result and is hereby recommended for poultry farmers.

REFERENCES

1. Salami, R.I. and A.A. Odunsi, 2003. Evaluation of processed cassava peel meals as substitute for maize in the diet of layers. Int. J. Poultry Sci., 2: 112-116.
2. Ukachukwu, S.N., 2005. Studies on the nutritive value of composite cassava pellets for poultry. Chemical Composition and Metabolizable Energy of Livestock Research for Rural Development, 17C11.
3. International Institute of Tropical Agriculture (IITA), 1990. Cyanide in cassava, it's not there it just happen.
4. Adebayo, A.A. and A.L. Tukur, 1999. Adamawa State in Maps, First edition, published by paraclete pulishers Yola Nigeria.
5. A.O.A.C., 1990. Official method of analysis 13th edition Association of Official Analytical Chemist Washington D.C.
6. White, W.B., H.R Bird, M.L. Sunde, J.A.A. Marlett, M.A. Prentice and W.C. Burger, 1981. Viscosity of D-glucan as afactor in the enzymatic improvement of barley for chicks Pouult. Sci., 62: 853-862.
7. Han, Z., 1997. Effect of enzyme supplementation of diets on the physiological function and performance of poultry IORC publication.
8. Patridge, G. and C. Wyatt, 1995. More flexibility with new generation of enzymes. World Ppoultry, 11(4): 17-21.
9. Vander Klise, J.D. Schelle and C. Kwakwelnaak, 1995. Wheat characteristics related to its feeding value to the response of enzymes. Proc.10th European Symposium of poultry nutrition 15th -19th Oct. Antaiju, Turkey World Poultry Science Association, pp: 160-168.
10. Peng Y.L., Y.M. Guo and J.M. Yuan, 2003. Effect of microbial phytase and xylanase on the growth performance and nutrients digestibility of broilers fed went base diets. Asian Aust, J. Animal Sci., 16(2): 239-247.