GROWTH RESPONSE OF BROILER FINISHERS FED GRADED LEVELS OF COOKED AND FERMENTED CASTOR OIL BEAN (*RICINUS COMMUNIS L*) MEAL

Agbabiaka L A

Department of Fisheries Technology, Federal Polytechnic Nekede, Owerri, Nigeria
P.M.B. 1036, Owerri, IMO State Nigeria
adegokson2@yahoo.com

ABSTRACT

28 days feeding trial was conducted to determine the growth performance of broiler finishers fed graded levels of fermented castor oil bean (*Ricinus communis L*) meal. Castor oil bean seeds were dehulled and detoxified by cooking, fermentation and oven drying at 70^{o}c for 9 hours. Eighty four (84) five weeks old unsexed broiler finisher (Anak Strain) were randomly divided into four groups of 21 birds each in a completely randomized design (CRD). Each group was fed isocaloric (ME= 2860 Kcal /Kg) and isonitrogenous (19.3 % crude protein) diets containing 0% (control), 5%, 10% and 15% levels of dehulled cooked and fermented castor bean meal (CBM) respectively for four weeks. There were no significant (p>0.05) differences between birds fed the control (0%) and those fed 5% CBM diets in all the parameters except FCR (P<0.05). Inclusion levels of CBM above 10% caused significant (p<0.05) reduction in Average Daily Feed Intake (ADFI), daily weight gain, feed conversion ratio and protein intake. Overall, the birds fed diet containing 15% CBM had the lowest performance. It was concluded that dehulled, cooked and fermented CBM could be included at 5% dietary level in broiler finisher diets without adverse effect on the performance.

Keywords: Broiler finisher, castor bean meal, dehulled cooked and fermented performance.

INTRODUCTION

The expansion of the poultry industry depends to a large extent on the availability of good quality feed in sufficient quantity at a price that farmers/producers can afford. However, the use of nutritionally balanced concentrates in ration is a *Sinu quano* to performance of intensive poultry enterprises (Babatunde and Hamzat, 2005). The tremendous increase in the cost of conventional feedstuffs especially protein concentrates such as soybean meal, groundnut cake and fishmeal has triggered the continued researches for alternative protein feedstuffs for use in intensive animal production to curtail the wide gap between demand for animal protein intake and protein supply of Nigerians (Agbabiaka, 2010).

Feed alone constitutes about 60-70% of the production cost in animal agriculture (Esonu *et al*., 2006) hence, utilization of alternative agricultural and agro-industrial by-products become necessity with valuable results in livestock and poultry production (Udedibie *et al*., 2002; Ani and Okorie, 2005; Esonu *et al*., 2006).

One of such by-products is castor bean (*Ricinus communis*, L) from castor oil extraction industry. It has crude protein content ranging from 20.15-29.13% depending on processing methods. The lipid content is quite high which ranged between 36.91-44.75% while the soluble carbohydrate is between 21.15-34.99% (Agbabiaka *et al.,* 2011). Despite the above nutritional potential of castor seed meal, it is also rich in phytochemicals/anti-nutrients such as Tannins, Oxalate, Phytin-phosphate and Phytic acids which necessitates adequate processing before the castor seed meal can be utilized by livestock (Ani and Okorie, 2005; Agbabiaka *et al.,* 2011). This trial is aimed at determining the effect of cooking and fermentation of castor bean meal on the performance of broiler finisher birds.

MATERIALS AND METHODS

Experimental station: This study was carried out at the Teaching and Research Farm, Federal Polytechnic Nekede, Owerri, Nigeria. The castor bean seeds used for the study were obtained from Ogbete Market in Enugu State, Nigeria. The seeds were dehulled manually by cracking them between two stones. The hulls were separated from the cotyledons by hand picking.

Table 1: Proximate Composition of test ingredient (Processed Castor Oil Bean)

Parameters	concentration (%dry matter)
Moisture	3.60
Crude protein	22.14
Crude lipid	36.79
Crude fibre	3.23
Ash	3.19
Soluble carbohydrate (NFE)	34.65

Table 2. Gross Composition of Experimental Diets

	Dietary levels of CFCBM			
INGREDIENTS	0%	5%	10%	15%
Maize	52.00	51.00	50.00	49.00
Soybean Meal	23.00	19.00	15.00	11.00
CFCBM	-	5.00	10.00	15.00
Wheat Offal	10.00	10.00	10.00	10.00
Fish Meal	5.50	5.50	5.50	5.50
PKC	5.00	5.00	5.00	5.00
Bone Meal	3.50	3.50	3.50	3.50
Vitamin Premix	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total	100	100	100	100
*Crude Protein (%)	19.51	19.42	19.40	19.24
*ME (Kcal/Kg)	2860	2860	2860	2860

ME= Metabolisable energy, *Calculated values

Table 3: The growth performance of Broiler Finisher fed graded levels CFCBM.

	Dietary levels of CFCBM			
Parameters	0%	5%	10%	15%
Av. Initial Wt. /Bird (g)	1070	1110	1100	1060
Final Weight /Bird (g)	2000	1930	1610	1480
Body Weight Changes/Bird (g)	930^{a}	820^{a}	510^{b}	420^{c}
Total Feed Intake/Bird (g)	4820^{a}	4330^{a}	3920^{b}	3270^{c}
Daily Feed Intake/Bird (g)	172.14^{a}	154.64^{ab}	140.00^{b}	116.79^{c}
Feed Conversion Ratio	2.40^{a}	2.24^{b}	2.44^{a}	2.41^{a}
Protein Intake	0.92^{a}	0.83^{a}	0.75^{ab}	0.62^{b}
Mortality	0	0	0	0

.^{abc} Means on the same row with different superscripts are significantly ($p<0.05$) difference

Detoxification of the dehulled seeds was done by cooking for an hour. The cooked seeds were defatted by mechanical extraction using an oil mill press, fermented for 5 days and oven dried at 70^{o}c for 9hours prior to milling. The milled sample (CFCBM) was mixed with other feedstuffs to formulate broiler finisher diets.

Experimental birds and design

Eighty four (84) five- week old unsexed commercial broiler finisher chicks (Anak Strain) were randomly divided into four groups of 21 birds each in a completely randomized design (CRD).

Each group was fed Isocaloric (ME=2860 kcal/kg) and is nitrogenous (19.3% CP) diets containing 0%, 5%, 10% and 15% levels of dehulled, cooked and fermented CBM respectively for four weeks. Each treatment was further sub-divided into 3 replicates of 7 birds reared in 2m X 1m deep litter pens. Water and feed were given *ad libitum* while other routine poultry management was maintained. The feed intake was recorded daily by subtracting from the quantity of feed given, the left over at the second day; whereas live weight gain were recorded weekly for each replicate. Feed conversion ratio was then calculated from these data as quantity of feed taken (g) per unit weight gained (g) over the same period. The data obtained were subjected to analysis of variance and means were separated using Duncan Multiple Range Test (Duncan, 1955).

RESULT AND DISCUSSION

The nutrients assay of the cooked and fermented castor oil bean meal (CFCBM) is presented in table 1. The gross composition of feeds/diets and growth response of broiler finisher birds were presented in tables 2 and 3 respectively. The chemical analysis of diets (table 4) revealed that ether extract increased linearly with dietary inclusion of CFCBM while the crude protein content diminished (P>0.05) as concentration of CFCBM increased in the diets (table 3).

However, it was observed that feed intake and body weight changes of the trial birds decreased with increase dietary inclusion of CFCBM. There were significant differences among the treatments based on these parameters. Nevertheless, there was no significant differences among the birds fed control diet (0%) and those fed 5% CFCBM based diets (P>0.05) but significantly different (P<0.05) from the birds fed diets containing CFCBM at 10% and 15% dietary levels respectively (table 2).

The best feed convention ratio (FCR) of 2.24 was obtained from birds fed 5% CFCBM based diet which was significantly different from other dietary treatments (P<0.05). Generally, birds fed the control diet (0%) had the best performance in terms of body weight gain with the value of 930g while the least figure of 420g was recorded for birds fed 15% CFCBM diets (P<0.05). Similar trend occurred for the average daily feed intake (ADFI) with values of 116.79g and 172.149 for birds fed 15% CFCBM and control (0%) diets respectively (P<0.05).

The increase in ether extract of trial diets as CFCBM increased in the feeds may be attributed to high lipid content of castor oil bean (Agbabiaka *et al*., 2011). The crude protein concentration on the diets is inversely proportional to the dietary levels of CFCBM (table 4). This may be attributed to the inferior crude protein content of castor oil bean compared with soybean meal (Aduku, 1993; Agbabiaka *et al*., 2011).

It was observed that feed intake decreased with increased concentration of CFCBM in the diets. This agrees with the finding (Lee *et al.,* 1978; Ani and Okorie, 2002 & 2005) that birds fed high levels of castor oil bean meal diets up to 15% and 20% exhibited least performance in feed intake, weight gain and feed conversion ratio. This result also agrees with earlier reports by Okorie and Anugwa (1987) and Okorie *et al* (1988) that the growth performance of chicks fed 0% roasted castor cake (RCC) diet was better than that of chicks fed 10% RCC diet.

The poor performance of birds fed CFCBM based diets beyond 5% compared with control diet might be as a result of residual concentration of phytotoxins in castor bean meal despite processing (Agbabiaka *et al*., 2011), antinutrients such as phytate, Tannins and Oxalate have been reported to induce poor utilization of feed nutrients by monogastric. Polyphenols usually give bitter taste to feedstuffs where they exist thereby impairing feed intake while phytate decreases mineral utilization and/or absorption of nutrients hence, reduce growth in monogastrics (Jaffe, 1980; Esonu, 1996; Udedibie *et al*., 1998; Agbabiaka *et al*., 2006).

CONCLUSION

The trial herein reported showed that the CFCBM cannot successfully replace soybean mean in diets of broiler finisher but can be included at 5% dietary level without adverse effect on performance. It could be observed from the table 3, that the performance of 0% and 5% was similar. The observed improvement in performance may be attributed to method of processing which involved dehulled and detoxification by cooking and fermentation prior to oven drying.

Table 4: Proximate Composition of Experimental diets fed to broilers

	Dietary treatments (%)			
Parameters	**0**	**5**	**10**	**15**
Moisture	7.86	8.22	8.25	9.15
Crude protein	19.90	19.36	18.77	18.64
Crude fibre	6.77	7.86	8.45	8.90
Ash	8.33	8.90	9.23	9.45
Ether extract	7.30	8.13	10.88	11.20
Nitrogen free extract	49.84	47.53	44.42	42.66
*ME (Kcal/kg)	2932.40	2961.30	3036.50	3097.50

LITERATURE CITED

Aduku AO, 1993. Tropical feedstuff analysis table. Department of Animal Science, ABU, Samaru, Zaria. Nigeria

Agbabiaka LA, Odoemenam SA and BO Esonu, 2006. Preliminary investigation on the potentials of wild variegated Cocoyam (*Caladium hortulanum*) replacement for maize in diets of catfish (*Heterobranchus bidorsalis*) fingerlings*. Int. J. Agric and Rural development,* **7**(1): 138 – 142.

Agbabiaka LA, 2010. Evaluation of some underutilized protein feedstuffs in diets of (*Clarias gariepinus*) fingerlings. *Int. J. Trop. Agric. Food Syst*., **4**: 10-12.

Agbabiaka LA, SA Amadi, GOM Oyinloye, II Adedokun and CA Ekeocha, 2011a. Growth response of African catfish (*Clarias gariepinus*) to Dried Rumen Digesta as dietary supplement. *Pakistan Journal of Nutrition* **10**(6): 564 – 567.

Agbabiaka LA, FN Madubuike and BO Esonu, 2011b. Effect of Processing on Nutrients and Anti-nutrients of Castor Oil Bean (*Ricinus communis*) Seeds and By products. *Pakistan Journal of Nutrition* **10**(6): 561-563.

Ani AO and AU Okorie, 2002. The nutritive value of dehulled and cooked castor oil bean (*Ricinus communis, L)* meal to broiler finishers. *Proceedings of the 27th Annual conference; Nigeria Society for Animal Production,* Federal University of Technology, Akure, Nigeria. March 17-21, 2002.

Ani AO and AU Okorie, 2005. The effect of graded levels of dehulled and cooked castor oil bean (*Ricinus communis* L) Meal on performance of broiler starters. *Nigeria J. of Animal Production.* **32**(1&2):54 60.

Babatunde BB and RA Hamzat, 2005. Effect of feeding graded levels of kolanut husk meal on the performance of cockerels. *Nigeria Journal of Animal Production* . **32** (1&2) 61- 66.

Duncan D, 1955. *Multiple range tests and Multiple F-test Biometrics* **11**: 1 – 42.

Esonu BO, 1996. *Studies on the methods of improving the nutritive value of the jack bean for poultry industry.* PhD Thesis. Dept of Animal Science and Tech. Federal University of Technology Owerri, Nigeria.

Esonu BO, UD Ogbonna, GA Anyanwu, OO Emelanom, MC Uchegbu, EB Etuk and ABI Udedibe, 2006. Evaluation of performance, organ characteristics and economic analysis of broiler finisher fed dried rumen digesta. *Int. J. Poult. Sci.*, **5**:1116-1118

Jaffe WG 1980. Hemaglutinins (lectins) in: Toxic constituents of plant foodstuffs. Liener IE. (ed) Academic press New York . 73 – 103

Lee KH, IK, Han and Y, Chiuny 1978. Studies of nutritive value of locally produced oil meals. *Food Science Technology* Abstrat 10:12

Okorie AU and FOI Anugwa 1987. The feeding value of roasted castor oil bean(*Ricinus communis* L) to growing chicks. *Plant foods for Human Nutrition.* **37**: 97 - 102

Okorie AU, EA Enunwonye and FOI Anugwa 1988. Response of broiler chicks to graded levels of heat – treated castor oil bean (Ricinus communis L) cake supplemented with DL – methionine. *Arch. Geflugelk* **52** (3):127 – 132.

Udedible ABI and CR Carlini, 1998. Crack and cook A simple and quick process for elimination of concanavalin A from canavalia seeds. *Anim. Feeds Sci. Technol*., **74**: 176-184.

Udedibie ABI, Esonu BO and Okah U, 2002. Determination of the optimum dietary levels of cracked and cooked jackbean meal for finisher broilers. *Nig. J. Anim. Prod.* **29**(2): 176-180