MON -58

Studies on Replacement Value of Raw Sandbox Seed Meal for Soybean Meal in Broiler Starter Diets

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Abstract
A 21-day feeding trial was conducted to determine the replacement value of raw sandbox *(Hura crepitans*) seed meal for soybean meal in broiler starter diet. Four experimental broiler starter diets were formulated, such that the diets contained raw sandbox seed meal at 0, 5, 10 and 15% dietary levels. One hundred and eighty (180) birds were selected and divided into four groups of 45 each and randomly assigned to the four treatment diets in a Completely Randomized Design (CRD). Each treatment group was further subdivided into three replicates of 15 birds each and housed in a compartment measuring 8 × 10 meters. Water and feed were supplied *ad-libitum*. Data were collected on feed intake, body weight gain, and feed conversion ratio. There was significant difference ($p<0.05$) in feed intake and body weight gain among the treatment groups, but there was no significant difference ($p>0.05$) among the treatment groups in feed conversion ratio. The group on 15% dietary level recorded the highest feed intake, while the group on 0% dietary level recorded the least feed intake. The group on 15% dietary level recorded the highest body weight gain, while the group on 0% dietary level recorded the least.The result of this study suggests that raw sandbox (*Hura crepitans*) seed meal can replace soybean and enhance the performance of broiler starter at 15% dietary level

Keywords: Sandbox seed, *Hura crepitans,* soybean, broiler starter, feed

Introduction

Energy feedstuff constitute between 60and 75% of finished feed for monogastric animals.Presently maize constitutes the bulk of the energy source in finished compound feed. Other grains which are used at a lesser extent include sorghum, millet, wheat, barley, oat, cassava, chips, molasses etc. However maize production falls far below its industrial, food and animal feed requirements in Nigeria (Agbabiaka, 1999).This has resulted in increase in the price of maize and other grains in recent times. Soya beans (*Glycine max*) and groundnut (*Arachis hypogea*) meals are protein sources which also play vital roles in the feeding of monogastric animals in Nigeria (Agbabiaka, 1999). These commodities are becoming scarce and consequently expensive as a result of high demand due to stiff competition between humans and animal. These factors have given rise to the search for non-conventional, low cost, but nutritionally adequate feed resources that currently do not attract competition for other uses apart from livestock production. One of such target feed resources is the sandbox (*Hura crepitans*).

The tree (Hura) is a shade tree with a thorny trunk commonly found on roadsides in towns and villages in Nigeria. There have been reports of free ranging turkeys scrambling to pick and swallow whole seeds as they burst forth from dehiscing fruits (Yaakugh *et al.,* 2001). Yaakugh *et al.* (2001) reported that the seed is high in protein (38 - 39%) fats and oil (up to 51%) and also higher in some essential amino acids like lysine, methionine, threonine and histidine comparable to soybean seed. The mineral content is also similar to the levels found in conventional oilseeds except that it is very low in phosphorus. Recent feeding trials by Esonu *et al*. (2014) and Ozeudu *et al*.(2015)indicate that low inclusion level of sand box seed meal in the diet of starter broilers gave promising performance.This feeding trial was conducted to determine the replacement value of raw sandbox *(Hura crepitans*) seed meal for soybean meal in broiler starter diet

Materials and Methods

The sandbox seeds were crushed raw and sun-dried for three days. Sample of the processed seeds was subjected to proximate analysis according to AOAC (1995), to determine its proximate composition. Four experimental broiler starter diets were formulated, such that the diets contained raw sandbox seed meal at 0, 5, 10 and 15% levels respectively. Other ingredients were adjusted in such a way that the diets were iso-nitrogenous and met nutrient requirements of the starting broiler (Obioha, 1992). Ingredient composition and analyzed chemical composition of the diets are presented in table 2.

One hundred and eighty (180) birds were selected and divided into four groups of 45 birds each and randomly assigned to the four treatment diets in a Completely Randomized Design (CRD). Each treatment group was further subdivided into three replicates of 15 birds each and housed in a compartment measuring 8 × 10.

Feed and water was provided *ad-libitum,* while the compartments were heated using 200 watt electric bulbs. Other routine poultry management practices were maintained. Feed intake was recorded daily, the birds were weighed weekly and feed conversion ratio computed accordingly. The trial lasted for 21 days.

Table 1: Ingredient composition of experimental diets

Dietary Levels	0%	5%	10%	15%
Ingredients				
Maize	52.00	52.00	52.00	52.00
SBM	28.00	26.60	25.20	23.80
SBXM	0.00	1.45	2.80	4.20
PKC	5.00	5.00	5.00	5.00
Wheat Offal	9.00	9.00	9.00	9.00
Fish Meal	2.00	2.00	2.00	2.00
Bone Meal	3.00	3.00	3.00	3.00
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
Calculated chemical composition of the Experimental diets				
Crude Protein	22.12	21.81	21.50	21.18
Crude fibre	4.62	4.54	4.52	4.51
Ether Extract	3.78	3.77	3.75	3.74
Calcium	0.15	0.15	0.14	0.14
Phosphorous	1.38	1.35	1.37	1.38
ME(kcal/kg)	302.2	300.7	299.2	297.18

*To provide the following per kg diet: Vit.A10000iu. Vit.D 2000iu,Vit.E 5iu, Vit.k 2.5mg, Riboflavin 5.5mg, Vitamin 12, 0.01mg, Vitamin Z, 0,01mg, Pantothenic acid, 6mg, Niacin, 5mg, Chlorine 3mg, Folic acid4mg, Mn 8mg, Zn 0.5mg, Iodine 1.0mg, Co 1.2mg, Cu 10mg and Fe 20mg.

Data collected were subjected to analysis of variance (ANOVA) and where analysis of variance indicated significant difference, means were compared using Duncan New Multiple Range Test (DNMRT) as outlined by Obi (1990).

Results and Discussion

The proximate composition of sand box seed meal is presented in table 2, while data on the performance of the chicks are shown in table 3.The crude protein value of raw sandbox meal at 23.70%was within that reported for most legumes by Akinmutimi (2004) and Seena *et al.*(2006), thus making sandbox seed a probable protein source in cereal based diets (Sakarika *et al.,* 1999) and alternativevegetable protein source (Seena*et al.,* 2006). The crude fibre content is moderate and makes it desirable and important in diets for farm animals. The lipid value at 2.71% for raw sandbox seed is similar to other unconventional legumes such as sword bean (Akinmutimi, 2004) and *Atylosia scarabaebides* (Arinathan *et al.,* 2003). The nitrogen free extract (NFE) at 52.90% also compared favorably with sword bean and *Mucuna conchinchinesis* (Ukachukwu, 2000; Akinmutini, 2004).

Table 2: Proximate composition of raw and cooked sand box seed

Components (%)	RSBM	CSBM
Dry Matter	90.381	90.979
Crude Protein	23.696	21.507
Crude Fibre	5.659	16.300
Ether Extract	2.712	7.589
Ash	6.026	5.240
Nitrogen Free Extract	52.897	45.633

All values expressed on 100% DM

There was significant difference ($p<0.05$) in feed intake among the treatment groups. Birds on the 15% dietary level recorded significantly ($p<0.05$) higher feed intake than the birds on the other dietary inclusion levels. The group also recorded the highest feed intake, while the control group recorded the least. Again, birds on 15% dietary level recorded significantly higher body weight gain than the groups($p<0.05$). There was however no significant differences ($p>0.05$) among the treatment groups in feed conversion ratio.

Table 3: Performance of broiler starter chicks fed raw sandbox(*Huracrepitans*) seed meal

Parameters	0%	5%	10%	15%	SEM
Average initial body weight (g	151.39	151.25	151.51	51.96	-
Average final body weight (g	504.14	510.00	512.00	560.95	10.05
Average body weight changes (g)	352.35	358.75	360.49	408.99	12.13
Average daily weight gain (g)	16.79^{b}	17.08^{b}	17.16^{b}	19.43^{a}	8.15
Feed conversion ratio (g)	48.54^{b}	50.13^{b}	51.49^{b}	57.13^{a}	5.06
Mortality	-	-	-	-	-

ab means within rows with different superscripts are significantly different ($p<0.05$).
SEM: Standard error mean

Generally, the experimental birds on 15% raw sandbox meal performed better than the groups on control (0%). This improved performance could be attributed to the fact the raw sandbox seeds contain amino acids at levels that compared favorably with soybean and groundnut seeds and even better in terms of levels of essential amino acids (Yaakuph *et al.,* 2001). This is because the nutritive value of a protein is dependent on the extent to which the composition of its essential amino acid fulfils the requirement of the animal being fed (Benitez, 2001).

Conclusion

These results suggest therefore, that raw sandbox seed meal could replace soybean meal at 15% dietary level in broiler starter diet.

References

Agbabiaka, L.A. (1999). Comparative performance of broilers fed diets containing variously processed Jack bean meals.

Akinmutini, A.H. (2004). Evaluation of Swordbean (*Canavalia gladiate*) as an alternative feed resources for broiler chicken Ph. D. Thesis, College of Animal Science, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

Arinathan, V., Mohan, V.R. and De Britto., A.J. (2003). Chemical composition of certain tribal pulses in South India. *Int. Food Sci. and Nutrition,* 54:209-217.

Benitez, L.V. (2001). Amino acid, fatty acid profile in aquaculture nutrition studies fish Nutrition research in Asia.

Esonu, B.O., Ozeudu, E., Emenalom, O.O., Nnaji, C. and Onyeikegbulam, I.K. (2014). Nutritional value of Sandbox (*Hura crepitans*) seed meal for broiler finisher birds. *J. of Natural Science Research,* 4(23):

Obi, I.U. (1990). Statistical method of detecting differences between treatment means, 2nd Edition, Snap Press, Enugu.

Obioha, F.C. (1992).*A guide to poultry production in the tropics.* ACENA Publication Ltd, Enugu, Nigeria.

Ozeudu, E., Esonu, B.O. and Emenalom, O.O. (2015). Performance of starter broiler chicks on sandbox (*Hura crepitans*) seed meal. *Nig. J. Anim. Prod.,* 42:

Saganka, E. Nol, R.J. and Baboo, M.N. (1999). Proximate composition, mineral and amino acid content of mature *Canavalia gladiate* seeds. *Food Chemistry,* 66:115-119.

Seena,S.K., Sridhar, R., Arun,A.B. and Chichung, Y. (2006). Effect of roasting and pressure-cooking on nutritional and protein quality of seeds of mangrove legume *Canavalia cathartica* from South-West coast of India. *J. Food Composition and Analysis,* 19:284-293.

Ukachukwu, S.N. (2000). Chemical and nutritional evaluation of *Mucuna conchinchinesis* (Lyon's beans) as an alternative protein ingredient in broiler diets. PhD. Thesis, University of Nigeria, Nsukka, Nigeria.

Yaakugh, I.D.I., Tuleun, C.D. and Kaankuka, F.G. (2001). Nutrient composition of hura. Department of Animal Production, University of Markurdi, Nigeria.