PERFORMANCE AND COST BENEFIT OF FNISHER BROILERS FED PROCESSED SICKLE POD (*Cassia tora)* SEED MEAL AS REPLACEMENT FOR DIETARY FULL FAT SOYA BEAN

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Abstract

An experiment was conducted to assess the growth performance and cost benefit of substituting full fat soya bean (FFSB) for soaked-toasted cassia tora seed meal (STCS) in the diets of finisher broilers. Five diets were formulated in which STCS replaced FFSB at 0, 25, 50, 75 and 100% levels designated as diets 1, 2, 3, 4 and 5 respectively. Three hundred broiler chickens weighing between 850 and 869 g were randomly allotted to five diets in replicates of four containing 15 birds each in a completely randomized design. Feed and water were provided ad libitum and the experiment lasted for 28 days. Results showed that daily feed intake (79.61 – 97.01g) did not differ among diets. However, daily weight gain (17.33 – 40.11g), total weight gain (485.24 – 1123.08g) and feed conversion ratio (2.33 – 4.65) were significantly (P<0.05) affected. Broiler birds fed diets containing STCS beyond 25% level resulted in lower performance. A cost saving of ₦13.74was realized on diet 2. It was therefore concluded that soaked-toasted cassia tora seed meal can replace full fat soya bean at 25% level in finisher broiler diets without compromising performance and a reduction in feed cost.

Keywords: Finisher Broilers, performance, cost benefit, *Cassia tora*, full fat soya bean

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Introduction

Protein sources are the second largest component of practical poultry diets. A limited number of ingredients are used by commercial poultry industries to supply protein. These ingredients are mostly limited in distribution and are also generally expensive than energy sources (Paul *et al.*, 2017). Soya bean seed is the main protein source used by poultry feed manufacturers. However, in Nigeria, its price is high and tends to fluctuate with changes in climatic conditions and social situations (Akande *et al.*, 2010). Accordingly, any shift in the use of ingredients other than soya bean, more especially the non-conventional ones, as plant protein sources, will greatly reduce the pressure on soya bean and reduce poultry feed cost which stands at about 70% of the total cost of intensive poultry production (Olorede and Longe, 1999; Anamayi, 2018).

Although the utilization of non-conventional plant protein sources e.g leguminous seed and leaf meals may be cost effective, their use is principally limited by the presence of anti-nutritional factors (ANFs) (Gatlin *et al.*, 2007). In order to eliminate or reduce the effect of these ANFs, several processing methods like soaking, cooking, toasting and sprouting have been identified (Torki and Farahmand-Pour, 2007 Ahamefule and Odemelam, 2008; Omoikhoje *et al.*, 2009; Buba *et al.*, 2010).

Cassia tora is an un-conventional plant protein ingredient that may be used in poultry rations. According to Ingweye *et al.* (2010), the seeds have good nutritional properties (protein 29.54%, methionine 0.92g/100g and energy 325.28 kcal/kg) but contain some ANFs (tannins, alkaloids, phytates and saponins). The aim of this study was to ascertain the performance of finisher broiler

chickens fed diets containing double stage processed (soaked and toasted) *Cassia tora* seed meal as replacement for full fat soya bean.

MATERIALS AND METHODS

The experiment was conducted at the Poultry Production unit, Ministry of Animal Husbandry and Nomadic Affairs, Gombe, Gombe State.

Soya bean was cleaned, boiled for 30 minutes using jute bags and sun-dried for 3-4 days. Similarly, mature *Cassia tora* seeds were harvested from the wild, around Tukulma village, Gombe state. The seeds were manually threshed from the pods and spread on a floor to sun-dry for two days. Thereafter, the seeds were soaked in clean water for 24 hours, sundried and toasted in a frying pan until they began to change colour. The two ingredients (soya bean and *Cassia tora*) were then crushed to 3mm particle size and kept in 50kg bags until when ready for use. Samples of *Cassia tora* were analysed for proximate composition (table 1) according to AOAC (2011).

Table 1: Proximate Composition of Soaked-Toasted *Cassia tora*.

Nutrient (%)	Level
Dry Matter	96.32
Crude protein	26.55
Crude fibre	6.92
Ether extract	5.08
Ash	8.69
Phytate (mg/100g)	117.08
Hydrocyanic acid (mg/kg)	3.52
Tannin (mg/100g)	128.43

Five isonitrogenous, isocaloric experimental diets containing 20% crude protein were formulated, with *Cassia tora* seed meal replacing full fat soya bean at 0, 25, 50, 75 and 100% levels coded as diets 1, 2, 3, 4 and 5 respectively (Table 2).

Table 2: Ingredients and Percentage Composition of Processed *Cassia tora* Seed Meal as Replacement for Full fat Soya Bean Fed to Finisher Broilers.

	DIETS				
INGREDIENT	**1**	**2**	**3**	**4**	**5**
Maize	52.10	52.10	52.10	52.10	52.10
Full-Fat Soya bean	24.40	18.30	12.20	6.10	0
Cassia tora	0	6.10	12.20	18.30	24.40
Wheat offal	15.00	15.00	15.00	15.00	15.00
Bone Meal	2.00	2.00	2.00	2.00	2.00
Fish meal	4.00	4.00	4.00	4.00	4.00
Limestone	1.50	1.50	1.50	1.50	1.50
Salt (NaCl)	0.25	0.25	0.25	0.25	0.25
Premix*(Finisher)	0.25	0.25	0.25	0.25	0.25
Methionine	0.30	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20	0.20
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated Analysis (%)					**100.00**
ME (Kcal/kg)	2976.08	2968.34	2959.10	2947.27	2935.08
Crude Protein	20.00	20.00	20.00	20.00	20.00
Ether Extract	6.25	6.48	6.71	6.95	7.19
Crude fibre	4.37	4.08	3.80	3.52	3.36
Calcium	1.81	1.79	1.78	1.76	1.73
Phosphorus	0.86	0.84	0.83	0.81	0.79
Methionine	0.62	0.64	0.65	0.67	0.69
Lysine	1.20	1.24	1.28	1.32	1.34

ME; Metabolizable Energy*Vit/mineral premix supplied/Kg of Diet: Vit. A, 8,500IU; Vit. $D_{3,}$ 2,000IU; Vit. E, 10mg; Vit. $K_{3,}$ 1.5mg; Vit. B_1, 1.6mg; Vit. $B_{2,}$ 4mg; Niacin, 20mg; Pantothenic acid, 5mg; Vit. $B_{6,}$ 1.5mg; Vit. $B_{12,}$ 0.01mg; Folic acid, 0.5mg; Biotin, 0.75mg; Choline chloride,175mg; Cobalt, 0.2mg; Copper, 3mg; Iodine, 1mg; Iron, 20mg; Manganese, 40mg; Selenium, 0.2mg; Zinc, 30mg and Antioxidant, 1.25mg.

A total of three hundred (300) unsexed *Abor acres* broiler chickens weighing between 850 – 869g were used for the experiment. The birds were randomly allotted to five experimental diets in 4 replicates of 15 birds each in a Completely Randomized Design. Feed and clean drinking-water were served *ad libitum* throughout the 28-day trial period.

Daily feed intake was determined by and birds were weighed on weekly basis. Feed conversion ratio was calculated from the values of feed intake and weight gain. Mortality was also recorded as it occurred. Prices of feed ingredients were recorded as at the time of study. Data were analysed using One-way Analysis of Variance (SPSS Statistics 17.0). DMRT was used for mean separation (Duncan, 1955).

Results and Discussion

The proximate composition (Table 1) of soaked-toasted sickle pod seeds (STCS) showed that it has a dry matter content of 96.32%, crude protein 26.55%, ether extract 5.08%, crude fibre 6.92% and an ash content of 8.69%. These values were comparable to those reported by Augustine *et al.* (2017) in fermented *Cassia tora* seeds. Similarly, the result revealed that the levels of anti-nutritional factors in STCS are phytate 117.08 mg/100g, hydrocyanic acid 3.52 mg/kg and tannin 128.43 mg/100g. The tannin content is lower than 330 mg/100g reported for Mung beans (Mubarak, 2005).

Performance of finisher broilers (Table 3) fed dietary levels of STCS as replacement for full fat soya bean soya bean showed no significant difference in initial weight of birds (850 and 869 g). Final weight (1335.43 – 1975.14, P<0.05) and total weight gain (485.24 – 1123.08g, P<0.05) were influenced by diets with better values on diets 1 and 2. Daily feed intake (80.56 – 97.01g) was also not significantly influenced by the replacement of full fat soya bean for STCS in the diets. This contradicts Augustine *et al.* (2017) who reported a significantly (P<0.05) lower feed intake in broiler chickens fed differently processed *Cassia tora* seeds. However, daily weight gain of birds on diet 2 (37.38 g) compared favourably with the control (40.11g) which was significantly (P<0.05) higher than diets 3 (21.29 g), 4 (18.42 g) and 5 (17.33 g). A similar finding was reported by Emiola *et al.* (2013), who fed processed Mucuna seed meal to broiler chickens. Feed conversion efficiency decreased significantly (P<0.05) with increased STCS above 25% level in the diets. This could be as a result of the higher levels of ANF present in these diets. Feed cost per kg (₦) decreased from ₦113.78 on diet 1 to ₦73.82 on diet 5. Feed cost per kg gain ((₦) was lowest (₦252.42) on diet 1 and highest on diet 4 (₦381.92). The highest cost saving of ₦13.74 was made on diet 2.

Table 3: Performance of Finisher Broilers Fed Dietary Levels of Processed *Cassia tora* as Replacement for Full Fat Soya Bean

	DIETS					
Parameter	**1**	**2**	**3**	**4**	**5**	**SEM**
Initial weight (g)	852.06	869.63	855.11	862.47	850.19	7.20^{NS}
Final weight (kg)	1975.14^{a}	1916.27^{a}	1451.23^{b}	1378.23^{c}	1335.43^{c}	19.53*
Total weight gain (g)	1123.08^{a}	1046.64^{a}	596.12^{b}	515.76^{c}	485.24^{c}	24.98*
Daily feed intake (g)	93.53	97.01	84.72	79.61	80.56	5.23^{NS}
Daily weight gain (g)	40.11^{a}	37.38^{a}	21.29^{b}	18.42^{c}	17.33^{c}	0.83*
Feed conversion ratio	2.33^{a}	2.60^{a}	3.98^{b}	4.32^{c}	4.65^{d}	0.08*
Mortality (number)	2	1	2	0	3	

[abcd]Means bearing different superscripts within the same row differ; * = (P<0.05),

NS= Not significant; SEM = Standard Error of Mean.

Table 4: Cost-Benefit of Finisher Broilers Fed Processed *Cassia tora* Seed Meal as Replacement for Dietary Full Fat Soya Bean

Parameter	1	2	3	4	5
Total feed intake (g)	2618.84	2716.28	2372.16	2229.08	2255,68
Feed cost /kg (₦)	113.78	97.44	92.47	89.06	73.32
Total feed cost (₦)	298.10	265.03	219.15	198.60	165.70
Total weight gain (g)	1123.08	1046.64	596.12	515.76	485.24
Feed cost /kg gain (₦)	266.16	252.42	358.58	381.92	338.16
Cost saving (₦)	-	13.74	-92.42	-115.76	-72.00
Per cent cost saving	-	5.16	-34.72	-43.52	-27.05

Conclusion

Cassia tora seed meal processed by soaking followed by toasting has good nutritional potentials and can replace full fat soya bean at 25% level in finisher broiler diets without compromising performance and a cost saving of ₦13.74.

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