Carcass Characteristics, Organ Weights and Economic Evaluation of Cockerels Fed Raw or Processed Sickle Pod (*Senna obtusifolia*) Seed Meal Based-Diets

Augustine, C[*1]., Kwari, I.D[2]., Igwebuikwe, J.U[2]., Adamu, S.B[2]., Doma U.D[3]. Moses, J.D.[4] and Medugu, C.I[2]

[1.] Department of Animal Production, Adamawa State University, Mubi, Nigeria.
[2.] Department of Animal Science University of Maiduguri, Nigeria.
[3.] Department of Animal Science Abubakar Tafawa Balewa University, Bauchi, Nigeria.
[4.] Department of Animal Production and Extension, Adamawa State University, Mubi, Nigeria.
audaggai@gmail.com

Abstract: The scarcity and high cost of conventional feed ingredients still remain a major challenge to the Nigerian poultry industry. Therefore concerted effort has to be put in place to encourage the utilization of a cheaper alternative feed. *Senna obtusifolia* is one of such alternative feed resource. However, the presence of anti-nutritional factors in the seeds is a major hindrance to the effective utilization of the seeds. This therefore calls for processing of the seeds before incorporation in the diets of chickens. It was in view of the above that, a feeding trial was conducted for one hundred and twelve (112) days to evaluate the carcass characteristics, organ weights and economic performance of cockerels fed raw or processed *Senna obtusifolia* seed meal based-diets. Six (6) experimental diets were compounded to contain 0 and 20% each of the raw, boiled, soaked, sprouted and fermented *Senna obtusifolia* seed meal designated as T1, T2, T3, T4, T5 and T6, respectively. Two hundred and sixteen (216) growing cockerels were managed in deep litter pens. The birds were allotted to the six dietary treatments in a randomized complete block design (RCBD) replicated three (3) times with twelve (12) chicks each. Pen location served as the blocking factor. Data were collected on live weight, plucked weight, and dressed weight, dressing percentage, cut-up parts, organ weights and cost-benefits of using *Senna obtusifolia* seed meal as a feed ingredient for cockerels. The data were analysed using Statistix 8.0 software package. The carcass characteristics were significantly (P<0.05) affected by the dietary treatments except for the head, neck, thorax and shanks. The lowest dressed weight and dressing percentage (402.70 g and 53.96%) were recorded in the group of cockerels fed raw *Senna obtusifolia* seed meal based-diet. However, the group of cockerels fed the fermented *Senna obtusifolia* seed meal based-diets indicated better dressed weight (850.35 g) and dressing percentage (63.78%) compared to the other treatment groups fed the raw or processed *Senna obtusifolia* seed meal based-diets. The cut-up parts significantly (P<0.05) followed similar a trend as that of the dressing percentage. The organ weights were significantly (P<0.05) affected by the dietary treatments except for the empty gizzard, heart and kidney. However, the liver was significantly (P<0.O5) heavier (3.72 g) in the group of cockerels fed raw *Senna obtusifolia* seed meal based diets. On economic ground, the use of *Senna obtusifolia* is cost effective except for the raw *Senna obtusifolia* seed meal which indicated higher feed cost per kilogram body weight gain (₦245.54). It can be concluded that the use of fermented *Senna obtusifolia* seed meal as feed ingredient for cockerels had more biological and economic benefits compared to the other processed *Senna obtusifolia* seed meals and is therefore recommended for feeding cockerels.
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Introduction

The major problem facing the Nigerian poultry industry is the high cost of poultry feeds and feed ingredient. Oloruntola *et al*. (2017) further buttressed that acute feed shortage being experience in an intensive rearing systems is a major constraint in developing Countries. This situation has directed the focus of animal nutritionists to intensify research on the exploitation of alternative feed resources.

Senna obtusifolia is an annual or biennial shrub growing up to 2.5 m tall, but usually less than 2 m in height. The leaves are pinnate and alternately arranged along the stem, borne on petioles 15 to 20 mm long. The flowers are yellow (10 to 15 mm across) while the pod is a slender, strongly curved downward (sickle shape), pod (6 to 18 cm long and 2 mm wide). The seeds (3 to 6 mm long) are dark brown in colour, shiny in appearance with rhomboid or irregular shape (Agnes, 2011). The chemical composition as revealed by Ingweye *et al*. (2010) and Augustine *et al*. (2013) indicated that it has good nutritional values (29.54 and 21.89% crude protein)

but also contained some anti-nutritional factors such as tannins, phytates, saponins and oxalates which could adversely affect nutrient utilization and overall performance of poultry. It is important to note that carcass yield is affected by the quality and utilization of a ration (Bamgbose and Niba, 1998). If the seeds of *Senna obtusifolia* are adequately processed, they may serve as an alternative protein source for cockerels. At the moment, not much work has been done to evaluate the carcass characteristics, organ weights and economic performance of cockerels fed raw or processed *Senna obtusifolia* seed meal based-diets and therefore, this study was conducted to investigate the best processing method (s) that will enhance optimal utilization of *Senna obtusifolia* seeds as a feed ingredient for cockerels.

Materials and methods

Location of the study area

The study was conducted at the Poultry Unit of the Department of Animal Production Livestock Teaching and Research Farm, Adamawa State University, Mubi, Nigeria. The area is located between latitudes 9°30' and 11°North of the equator and longitudes 13° and 13° 45' East of the Greenwich meridian. The temperature regime in Mubi area is warm to hot throughout the year however, there is usually a slight cold period between November and February. There is a gradual increase in temperature from January to April. The minimum and maximum temperatures of the area are 18.1°C and 32.8°C and the mean annual rainfall ranges from 900 to1050 mm (Adebayo, 2004).

Experimental stock and their management

Two hundred and sixteen (216) growing cockerels were managed in deep litter for a period of one hundred and twelve (112) days. The cockerels were vaccinated against Gumboro disease at 2 and 4 weeks, Newcastle disease at 3 and 5 weeks, fowl pox at 8 weeks and komorov at 14 weeks of ages. The experimental chick diets were fed *ad-libitum* to the chicks for fifty six (56) days while the grower's diets were also fed for fifty six (56) days. Clean drinking water was supplied *ad-libitum* throughout the period of the experiment.

Experimental diets (treatments)

The raw or differently processed *Senna obtusifolia* seed meals (soaked, boiled, sprouted and fermented) were included at 20% each in the diets of cockerels at both the chick and grower stages respectively (Tables 1 and 2). The six (6) treatment diets were designated as T1, T2, T3, T4, T5 and T6, respectively. Diet T1 contained 0% *Senna obtusifolia* seed meal and therefore served as the positive control while diet T2 contained the 20% raw *Senna obtusifolia* seed meal and served as the negative control.

Experimental design

The 216 growing cockerels were randomly allotted to the six dietary treatments in a randomized complete block design (RCBD). Each treatment group was replicated three times with 12 chickens per replicate. Pen location served as the blocking factor.

Table 1: Ingredient Composition and Calculated Analysis of the Experimental Chick Mash

Level of inclusion of each of the raw or processed *Senna obtusifolia* seed meal						
Ingredient	**T1 (0% SOSM)**	**T2 (20% RSOSM)**	**T3 (20% BSOSM)**	**T4 (20% SkSOSM)**	**T5 (20% SPSOSM)**	**T6 (20% FSOSM)**
Maize	50.00	50.00	50.00	50.00	50.00	50.00
Soya bean	18.10	9.00	10.00	10.00	10.00	10.00
SOSM	0.00	20.00	20.00	20.00	20.00	20.00
Groundnut cake	7.00	7.10	7.10	7.10	7.10	7.10
Fishmeal	6.00	6.00	6.00	6.00	6.00	6.00
Maize offal	16.00	5.00	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Salt (NaCl)	0.30	0.30	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20	0.20	0.20
Lysine	0.15	0.15	0.15	0.15	0.15	0.15
Premix	0.25	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculate analysis						
Protein (%)	19.26	18.32	18.17	18.12	18.21	18.47
Fibre (%)	4.00	4.72	4.71	4.72	4.70	4.68
Calcium (%)	1.25	1.26	1.25	1.26	1.26	1.26
Phosphorus (%)	0.81	0.81	0.82	0.82	0.82	0.82
*energy (kcal/kg)	3159.06	2900.50	2900.00	2912.00	2903.00	2906.00

*Metabolizable energy (ME) calculated according to the formula of Pauzenga (1985) ME 37 x % CP + 81 x % EE + 35.5 x % NFE, SOSM = *Senna obtusifolis* seed meal = Raw *Senna obtusifolia* seed meal, BSOSM = Boiled *Senna obtusifolia* seed meal, SKSOSM = Soaked *Senna obtusifolia* seed meal, SPSOSM Sprouted *Senna obtusifolia* seed meal, FSOSM Fermented *Senna obtusifolia* seed meal.

Table 2: Ingredient Composition and Calculated Analysis of the Experimental Growers Mash

Level of inclusion of each of the raw or processed *Senna obtusifolia* seed meal						
Ingredient	**T1 (0% SOSM)**	**T2 (20% RSOSM)**	**T3 (20% BSOSM)**	**T4 (20% SkSOSM)**	**T5 (20% SPSOSM)**	**T6 (20% FSOSM)**
Maize	54.00	54.00	54.00	54.00	54.00	54.00
Soya bean	17.00	7.00	7.00	7.00	7.00	7.00
SOSM	0.00	20.00	20.00	20.00	20.00	20.00
GNC	6.10	6.10	6.10	6.10	6.10	6.10
Fishmeal	5.00	5.00	5.00	5.00	5.00	5.00
Maize offal	15.0	5.00	5.00	5.00	5.00	5.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Salt	0.30	0.30	0.30	0.30	0.30	0.30
Methionine	0.20	0.20	0.20	0.20	0.20	0.20
Lysine	0.15	0.15	0.15	0.15	0.15	0.15
Premix*	0.25	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculate analysis						
Protein (%)	17.34	16.67	16.58	16.75	16.82	16.97
Fibre (%)	4.69	5.12	3.81	4.79	4.82	4.57
Calcium (%)	1.13	1.24	1.24	1.23	1.24	1.24
Phosphorus (%)	0.78	0.80	0.80	0.80	0.80	0.80
*Energy (kcal/kg)	3174.68	3016.22	3016.22	3016.22	3016.22	3016.22

*Metabolizable energy (ME) calculated according to the formula of Pauzenga (1985) ME= 37 x % CP + 81x % EE + 35.5 x % NFE, SOSM = *Senna obtusifolia* seed meal = Raw *Senna obtusifolia* seed meal, BSOSM = Boiled *Senna obtusifolia* seed meal, SKSOSM = Soaked *Senna obtusifolia* seed meal, SPSOSM = Sprouted *Senna obtusifolia* seed meal, FSOSM = Fermented *Senna obtusifolia* seed meal, GNC = Groundnut cake.

Parameters measured

Data on carcass characteristics, organ weights and cost benefits of feeding cockerels with raw or processed *Senna obtusifolia* seed meal were collected.

Statistical analysis

Data obtained were subjected to analysis of variance (ANOVA) of the randomized complete block design (RCBD) using Statistix 8.0 (Statistix, 2003). Duncans Multiple Range Test (DMRT) was used to separate the treatment means where significant differences occurred. Significant difference was considered at 5% level of probability.

Results and Discussion

Proximate composition of the experimental chick and growers Diets

The proximate composition of the experimental diets are presented in Tables 3 and 4. The crude protein and energy contents of the experimental chick diets which ranged from 17.48 to 18.05% and 2700.00 to 2826.10 kcal/kg for the chick diets and grower diets which ranged from 15.95 to 17.22% and 2902.25 to 32016.63 kcal/kg are adequate to meet the nutritional requirements of cockerels at both stages of growth. The protein contents of the diets are within the range (16 - 17%) recommended by Olomu (2011) but the energy values of the diets are higher than the range of 2650 - 2700 kcal/kg reported by Ganiyu (2005) for cockerels in the tropics. The different processing methods were observed to have reduced the tannins and total phenols components of the diets with fermentation recording the highest level of reduction (Tables 3 and 4).

Table 3: Analysed Chemical Composition of the Experimental Chick Mash

Level of inclusion of each of the raw or processed *Senna obtusifolia* seed meal						
Nutrients (%)	**T1 (0% SOSM)**	**T2 (RSOSM)**	**T3 (BSOSM)**	**T4 (SkSOSM)**	**T5 (SPSOSM)**	**T6 (FSOSM)**
Dry matter	93.25	91.33	92.58	91.75	93.01	93.66
Crude protein	18.05	17.48	17.77	18.11	18.09	18.05
Fibre	5.01	6.33	5.97	5.63	6.72	5.69
Ether extract (EE)	11.21	13.09	14.20	12.71	10.22	11.37
Ash	8.11	7.09	9.28	7.89	10.36	9.78
Nitrogen free extract (NFE)	35.22	31.72	32.18	31.96	31.77	31.09
Tannins	0.00	0.67	0.36	0.41	0.38	0.33
Total phenols	0.00	0.92	0.78	0.64	0.62	0.67
*Energy (kcal/kg)	2826.17	2833.11	2950.08	2834.89	2862.85	2700.00

*Metabolizable energy (ME) calculated according to the formula of Pauzenga (1985) ME 37 x % CP + 81 x % EE + 35.5 x % NFE, RSOSM = Raw *Senna obtusifolia* seed meal, BSOSM = Boiled *Senna obtusifolia* seed meal, SKSOSM = Soaked *Senna obtusifolia* seed meal, SPSOSM = Sprouted *Senna obtusifolia* seed meal, FSOSM = Fermented *Senna obtusifolia* seed meal.

Table 4: Analysed Chemical Composition of the Experimental Growers Mash

Level of inclusion of each of the raw or processed *Senna obtusifolia* seed meal						
Nutrients (%)	T1 (0% SOSM)	T2 (RSOSM)	T3 (BSOSM)	T4 (SkSOSM)	T5 (SPSOSM)	T6 (FSOSM)
Dry matter	92.50	92.00	92.08	91.55	92.31	91.66
Crude protein	16.35	16.00	15.95	17.22	16.35	16.68
Fibre	6.08	7.21	6.75	7.04	5.98	6.02
Ether extract (EE)	16.28	15.00	14.25	14.58	15.09	14.77
Ash	7.85	6.69	8.35	8.55	7.95	8.33
Nitrogen free extract (NFE)	36.00	32.70	33.00	31.68	34.77	31.21
Tannins	0.00	0.55	0.39	0.50	0.30	0.29
Total phenols	0.00	0.81	0.70	0.80	0.66	0.67
*Energy (kcal.kg)	3201.63	2968.91	2915.90	2942.76	2961.59	2902.25

*Metabolizable energy (ME) calculated according to the formula of Pauzenga, (1985) ME = x % CP + 81 x % EE + 35.5 x % NFE, RSOSM = Raw *Senna obtusifolia* seed meal, BSOSM = Boiled *Senna obtusifolia* seed meal, SKSOSM = Soaked *Senna obtusifolia* seed meal, SPSOSM = Sprouted *Senna obtusifolia* seed meal, FSOSM = Fermented *Senna obtusifolia* seed meal.

Carcass characteristics of cockerels fed with raw or processed *Senna obtusifolia* seed meal based-diets

The results on carcass characteristics and organ weights are presented in Table 5. The result indicated that live weight, plucked weight, dressed weight and dressing percentage were significantly ($P<0.05$) lower in the group of cockerels fed the raw *Senna obtusifolia* seed meal based-diet. However, the above parameters were significantly ($P<0.05$) higher in cockerels fed the positive control diet (0% SOSM) and the fermented *Senna obtusifolia* seed meal based-diets. The poor carcass yield recorded in the groups of cockerels fed the raw soaked and sprouted *Senna obtusifolia* seed meal based-diets could be attributed to the adverse effects of anti-nutritional factors present in the raw and residual anti-nutritional factors present in the soaked and sprouted *Senna obtusifolia* seed meals. It seems that soaking and sprouting could not reduce the anti-nutritional factors to tolerable levels. The live weight and dressing percentage of growing cockerels fed the neutral diet (0% SOSM) and 20% each of the processed *Senna obtusifolia* seed meals recorded in this study are close to the range of 1270 – 1753 g and 69.28 - 80.69% reported by Effiong *et al*. (2011), who similarly fed *Mucuna urens* seed meal based-diet to cockerels.

Table 5: Carcass Characteristics of Cockerels Fed Raw or Processed *Senna obtusifolia* Seed meals

Level of inclusion of each of the raw or processed *Senna obtusifolia* seed meal							
SOSM Parameters	T2 0% SOSM	T2 RSOSM	T3 BSOSM	T4 SKSOSM	T5 SPSOSM	T6 FSOSM	SEM
Live Wt. (g)	1500.00^{a}	750.00^{c}	1300.00^{b}	1133.30^{b}	1216.70^{b}	1333.30^{b}	115.21*
Plucked wt. (g)	1321.58^{a}	650.00^{c}	893.54^{ab}	766.94^{b}	763.23^{b}	1295.37^{a}	40.71*
Dressed wt (g)	966.67^{a}	402.70^{c}	766.67^{b}	645.65^{b}	666.67^{b}	850.35^{ab}	49.72*
Dressing %	64.44^{a}	53.96^{c}	58.97^{b}	56.97^{b}	54.79^{b}	63.78^{a}	2.31*
Cut-up parts and organ weights expressed as percentage of live body weight							
Head	4.16	4.13	3.94	4.74	4.30	4.34	0.09^{NS}
Neck	6.28	5.06	5.39	5.23	5.50	5.42	0.19^{NS}
Breast	12.60^{a}	10.09^{b}	12.60^{a}	11.38^{a}	11.17^{a}	13.77^{a}	1.47*
Back	8.65^{a}	7.02^{b}	7.64^{b}	7.21^{b}	7.81^{b}	8.38^{a}	0.36
Thorax	6.06	6.23	5.60	5.96	6.08	7.78	0.70^{NS}
Wings	10.31^{a}	8.85^{b}	9.09^{b}	9.35^{b}	10.49^{a}	7.91^{b}	0.80*
Shanks	6.20	5.52^{b}	5.43	6.05	6.14	6.48	0.22^{NS}
Thighs	12.65^{a}	5.62^{c}	8.77^{b}	8.07^{b}	9.49^{ab}	11.78^{a}	0.62*
Drum stick	7.44^{a}	5.52^{b}	5.43^{b}	6.05^{ab}	6.14^{ab}	6.48^{ab}	0.68*
Proventriculus	0.65^{a}	0.81^{a}	0.59^{c}	0.80^{a}	0.55^{c}	0.53^{c}	0.06*
Full gizzard	4.74^{b}	6.57^{a}	4.28^{b}	6.28^{a}	6.42^{a}	4.34^{b}	0.59*
Empty gizzard	3.19	3.97	3.22	3.90	3.83	4.04	0.25^{NS}
Heart	0.58	0.52	0.49	0.50	0.49	0.57	0.04^{NS}
Liver	2.11^{b}	3.72^{a}	2.17^{b}	2.57^{b}	2.56^{b}	2.41^{b}	0.15*
Kidney	0.67	0.78	0.71	0.68	0.75	0.64	0.075^{NS}
Pancrease	0.26^{c}	0.34^{bc}	0.41^{b}	0.32^{bc}	0.53^{a}	0.27^{c}	0.070*
Abdominal fat	0.84^{a}	0.38^{ab}	0.53^{b}	0.53^{b}	0.48^{b}	0.65^{ab}	0.09*

a, b, c = Means in the same row with different superscripts are significantly different (P<0.05), significant at 0.05, SEM = Standard error of means, NS = Not significant (P>0.05), RSOSM = Raw *Senna obtusifolia* seed meal, BSOSM Boiled *Senna obtusifolia* seed meal, SKSOSM = Soaked *Senna obtusifolia* seed meal, SPSOSM = Sprouted *Senna obtusifolia* seed meal, FSOSM = Fermented *Senna obtusifolia* seed meal, wt. = weight.

The improvement recorded in the group of cockerels fed the fermented *Senna obtusifolia* seed meal based-diet was due to the combined effects of cooking and microbial activities during fermentation which reduced the toxic factors and also improved the nutritional profile of *Senna obtusifolia* seed meal which positively enhanced the performance of the chickens. Tuleun *et al*. (2011) recorded a similar result when they fed fermented mucuna seed meal to broiler chickens.

The cut-up parts similarly indicated significant (P<0.05) variations. The breast, wings, thighs and drum stick were lower in cockerels fed the raw *Senna obtusifolia* seed meal based-diet, while higher (P<0.05) values for these cut-up parts were observed in those cockerels fed 0 and 20% each of the fermented and boiled *Senna obtusifolia* seed meals. The weight of organs were significantly (P<0.05) affected by the dietary treatments except for the heart, empty gizzard and kidney. The weight of proventriculus and gizzard were observed to be heavier in cockerels fed raw *Senna obtusifolia* seed meal based-diet. The heavier weight of gizzard recorded in this treatment group was attributed to additional work caused by the anti-nutritional factors and high fibre content of the unprocessed *Senna obtusifolia* seed meal. Similar observation was made by Effiong *et al*. (2011), who fed cockerels with *Mucuna urens* seed meals. Increase in weight of proventriculus and gizzard was due to greater work of digestion and metabolism caused by toxic components and high fibre content of the feed (Carmen *et al*., 1999; Carew *et al*., 2003). This is in line with the results of these finding. The weight of liver was observed to be significantly (P<0.05) heavier in cockerels fed the raw *Senna obtusifolia* seed meal based-diet. The chickens fed the positive control diet (0%) and the processed *Senna obtusifolia* seed meal based-diets recorded lower liver weight which is an indication that the processing methods used were able to detoxify *Senna obtusifolia* seed meal to levels that the liver of the chickens can tolerate. Uchegbu *et al*. (2004), reported similar effects for broiler chickens fed up to 15% raw *Napoleona Imperialis* seed meal and they attributed the effects to higher physiological activities triggered by the presence of anti-nutritional factors. The weight of liver obtained in this study is close to the range

(2.62 to 3.49 g) reported by Abeke *et al*. (2008) for broiler chickens fed *Lablab purpureus* seed meal.

The values for abdominal fats were significantly high (P<0.05) in cockerels fed 0% *Senna obtusifolia* seed meal but not significantly different from those fed the fermented *Senna obtusifolia* seed meals. The anti-nutritional factors present in the raw soaked and sprouted seed meal could be responsible for these effects. Ueda (2001) and Dong *et al*. (2007), pointed out that anti-nutritional factors such as saponins can inhibit the absorption of fat and cholesterol in the intestine hence affecting fat deposition in tissues. This report therefore is in agreement with the finding of this study. The intestinal weights were significantly (P<0.05) heavier in cockerels fed RSOSM which may be attributed to additional bulk of digesta staying in the gastrointestinal tract due to slower rate of digestion caused by anti- nutritional factors as reported by Ander (1992).

Cost-benefits of feeding cockerels with raw or processed *Senna obtusifolia* seed meal

The cost-benefits of feeding growing cockerels with raw or processed *Senna obiusifolia* seed meal is presented in Table 6. The feed cost and cost of total feed intake reduced in the group of cockerels fed *Senna ohtusifolia* seed meal based-diets. Cost of feed per kilogram was observed to reduce by 10.55, 7.62, 11.08, 9.63 and ₦7.28 in diets T2, T3, T4, T5 and T6, respectively. This pattern followed the result of Najima (2003) and Midala *et al.* (2013) who reported significant reduction in feed cost and cost of total feed intake when unconventional legume seed meal were utilized in poultry diets. However, feed cost per kilogram body weight gain was observed to be higher in the group of cockerels fed the raw *Senna obtusifolia* seed meal-based diets. This was attributed to the adverse effects of anti-nutritional factors on weight gain consequently reducing economic gain.

Table 6: Cost-benefits of Feeding Cockerels with Raw and Processed Senna obtusifolia Seed Meals

Level of inclusion of each of the raw or processed *Senna obtusifolia* seed meal							
Parameters	T1 0% SOSM	T2 20% RSOSM	T3 20% BSOSM	T4 20% SKSOSM	T5 20% SPSOSM	T6 20% FSOSM	SEM
Total feed intake (Kg)	3.99[a]	3.24[c]	3.58[b]	3.49[b]	3.31[c]	3.55[b]	0.027
Feed cost (₦)	71.63	61.08	64.01	60.55	62.00	64.35	-
Total feed cost (₦)	285.80	197.89	229.16	211.32	205.22	228.44	-
Total weight (kg)	1.25	0.81	1.07	0.91	0.96	1.08	0.01
Feed cost/kg gain (₦)	228.49	245.54	214.43	232.51	214.52	211.71	-

a, b, c = Means in the same row with different superscripts are significantly different (P<0.05), significant at 0.05, RS0SM = Raw *Senna obtusifolia* seed meal, BSOSM = Boiled *Senna obtusifolia* seed meal, SKSOSM = Soaked *Senna obtusifolia* seed meal, SPSOSM = Sprouted *Senna obiusifolia* seed meal, FSOSM Fermented *Senna obtusifolia* seed meal.

Conclusion

The outcome of this investigation revealed that carcass characteristics and organ weights of the chickens fed the differently processed *Senna obtusifolia* seed meal based-diets were observed to be better in the group of cockerels fed the neutral (0% SOSM) and fermented *Senna obtusifolia* seed meal based-diets. On economic ground, the use of processed *Senna obtusifolia* seed meal is cost effective.

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