



Effects of Toasted Sorrel (*Hibiscus Sabdariffa*) Seed Meal on Carcass and Internal Organs Evaluation of Broiler Finisher Chickens

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ABSTRACT

One hundred and fifty (150) broiler finisher chickens were used to evaluate the effects of graded levels of toasted Sorrel (*Hibiscus sabdariffa*) seed meal (TSSM) on carcass yield and internal organ characteristics. The chickens were randomly assigned to five dietary treatments consisting of three replicates of ten birds per replicate in a completely randomized design. The dietary treatments were the inclusion levels of toasted sorrel seed meal at 0%, 15%, 20% 25% and 30%. At the end of the experiment six (6) birds were randomly selected from each treatment and slaughtered to determine the effect of graded levels of toasted Sorrel seed meal on carcass yield and internal organs characteristics. Carcass yield and internal organs characteristics were also not significantly ($P>0.05$) influenced by the dietary treatments, except for average live weight, slaughtered weight and dressing percentage. Therefore 20% dietary level inclusion of toasted sorrel seed meal is recommended in broiler finisher diet.

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INTRODUCTION

The poor nutritional situation in Nigeria is very eminent due to the disparity between the estimated and/ or recommended protein needs and the real quantity of protein consumed. Ahamefule et al., (2000) estimated an average protein intake of Nigerians to be 8.27g/caput/day. Although, 28g/person/day was recommended by the British Medical Association (1993) while WHO recommended 34g/day/person (Akintola et al., 1999). In order to bridge the gap, there is need to improve on the production of livestock. Although, increasing the ruminant animals production is becoming difficult due partly to over utilization on the available land for grazing by humans.

Similarly, the greatest challenge to poultry production in Nigeria today is the high cost of feed and feed ingredients which Kwari et al., (2011) reported that the cost of feeding is attributed to the high cost and scarcity of

conventional feed ingredients like maize, groundnut cake, soyabean meals and fish meal.

Protein for poultry feed is usually supplied from two sources (plant and animal), the use of plant protein source in poultry feed is cheaper and when used in large quantity it ensures less expenditure as compared to the animal protein source. Therefore, the exploration of cheaper and safer plant protein source has become imperative. Nonetheless, sorrel seed is among the highest non-conventional protein-containing seeds when compared with other seeds like passion fruits (*Passiflora edulis*), black seed (*Nigella sativa* L.), and *Pisium sativum* (Ismail et al., 2008). Al-Wandawi et al (1984) reported that in Sudan, sorrel seeds are used for edible oil production and the by-products of this process were used for poultry feeding while Kwari et al., (2004) also reported that one of such non- conventional feed ingredients that can be



use as alternative to groundnut cake is the sorrel seed meal.

In Nigeria Dashak and Nwanegbo., 2002., Isidahomen, 2006 reported that sorrel seed contains between 21.40- 35.19% crude protein while Hainida et al (2008) in his latest findings reported that sorrel seed from Malaysia have 33.5% crude protein and 13.0% available carbohydrate.

The objective of the study was to determine the effect of replacing graded levels of groundnut cake with toasted sorrel seed meal on carcass and internal organs evaluation of broilers finisher chickens.

MATERIALS AND METHODS

Experimental Site

The study was conducted at the Taraba State College of Agriculture Jalingo, poultry unit of the Teaching and practical farm. Jalingo is located between latitude 8° 53" North and longitude 11° 23" East of the guinea savannah zone of northern Nigeria (Encartar, 2009). There are two main seasons existing in the area of study these are dry and rainy seasons. It has an annual rainfall of between 1000-1500mm with a temperature ranges from 30° – 38°C depending on the season. (Taraba State Diary, 2008).

Sources and Method of Processing of Sorrel Seeds

The sorrel seeds used in this study were sourced locally in Jalingo market and zing. The seeds were toasted for 30 minutes in a frying pan, using fire woods as sources of heat for toasting. Turning of seeds during toasting was done at a regular interval. The seeds were air-dried for two days and later milled then incorporated into the formulated experimental diets with a replacement level of 0, 15, 20, 25 and 30% for T1, T2, T3, T4 and T5 respectively.

Experimental Stock and Management

One hundred and fifty (150) Anak 2000 white mixed sex of broiler finishers were used for the study in a Randomized Complete Block Design. All the routine management practices including vaccinations were administered and water was offered *ad libitum*.

Treatments and Experimental Design

At four weeks old birds were individually weighed and randomly allocated to five (5) treatment groups of 30 birds each. Each treatment group was replicated thrice with ten (10) birds per replicate. However, five (5) experimental diets were formulated for finishers. Toasted sorrel seeds meal was incorporated to replace groundnut cake portion at 0, 15, 20, 25 and 30% representing T1, T2, T3, T4 and T5 respectively. The ingredient composition of the broiler finisher experimental diets is shown in Tables 1. The experiment lasted for 8 weeks.

Experimental Diets

Five experimental diets were formulated for the starter and finisher periods. Toasted sorrel seed meal was incorporated to replace groundnut cake portion at 0, 15, 20, 25 and 30% representing T1, T2, T3, T4, and T5 respectively. The ingredients composition of the finisher experimental diets is shown in Table 1.

DATA COLLECTION

Carcass Evaluation

At the end of the study which lasted for 8 weeks 3 birds were randomly selected from each treatment on the mean live weight of the birds in the group. The birds were weight and starved of feed over night but water was provided. The weight was recorded in the morning as live weight before slaughter.

The birds were individually slaughtered and the slaughter weight, dressed weight, dressing percentage and other cut-up parts and some visceral organs weights were determined for the individual birds slaughtered.

STATISTICAL ANALYSIS

All data generated were subjected to analysis of variance (ANOVA) using completely randomized block design (Steel and Torrie, 1980). Difference between treatment means was compared using Duncan Multiple Range Test (DMRT, 1955).

RESULT AND DISCUSSION

The proximate composition of the experimental diets and the test ingredients



(TSSM) as shown in table 1, indicated that there were slight variations in crude protein values and the values increases with increasing levels of (TSSM). The proximate composition of toasted sorrel seed meal (TSSM) shows that it contains 22.80% crude protein, 4.00% ether extract, 4.70% crude fibre, 52.00% nitrogen free extract, 14.20% ash and 3013.60(Kcal/kg) metabolisable energy, the variation from the results of proximate composition compared to those of Isidahomen et al., (2006) and John et al., (2010) could be due to various factors running from processing method, the type of soil on which the crop was grown and species difference (Ojewola and Ewa., 2005).

The results of carcass and internal organ characteristics as shown in table 2. Showed significant ($P>0.05$) difference in average live weight, slaughtered weight and dressing percentage among the treatment groups. The dressing percentage was in agreement with Deschepper and Degroote (1995) but lower than values obtained by Wafar (2013), other parameters measured were not ($P>0.05$) significantly different among treatment groups but were within the ranges as reported by above researchers. This shows the ability of the experimental diets to support tissue deposition to particular parts (Bamgbose et al., 1998).

The internal organs weight as shown in the table did not show significant difference ($P>0.05$) for liver, gizzard, full intestine and abdominal fat, this shows that the residual anti nutrient do not have observable effect on the organs (Rabo, 2012). The abdominal fat weight showed numerical increase with the increasing dietary levels signifying the fat content of the diet which leads to excess deposition of adipose tissue Sirato et al., (2011).

CONCLUSION

The result obtained from this study indicated that TSSM could replace groundnut cake up to 30% in broiler finisher chickens diet without adverse effect on the health and performance of the birds.

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Appendices

Table 1: Ingredients composition of the experimental finisher diets

Ingredients (%)	Diets/treatments				
	T1 (0%)	T2 (15%)	T3 (20%)	T4 (25%)	T5 (30%)
Maize	56.00	56.00	56.00	56.00	56.00
GNC	24.00	20.40	19.20	18.00	16.80
TSSM	00.00	3.60	4.80	6.00	7.20
Wheat offal	10.00	10.00	10.00	10.00	10.00
Fish meal	5.00	5.00	5.00	5.00	5.00
Blood meal	1.25	1.25	1.25	1.25	1.25
Bone meal	1.35	1.35	1.35	1.35	1.35
Limestone	1.30	1.30	1.30	1.30	1.30
Salt	0.40	0.40	0.40	0.40	0.40
Premix	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
	100.00	100.00	100.00	100.00	100.00
Calculated Analysis					
Crude Protein	21.63	21.30	21.19	21.08	20.97
Crude Fibre	2.28	23.5	2.38	2.41	2.43
ME (Kcal/kg)	2900.02	2931.12	2941.49	2951.86	2962.23

Composition of the vitamin-mineral premix (Bio-mix)kg



Vitamin A500iu; Vitamin D₃888,000iu; Vitamin E, 12,000mg; Vitamin K₃, 15,000mg; Vitamin B₁, 1000mg; B₂2000mg; Vitamin B₆, 1500mg; Niacin, 12000mg; Pantothenic acid, 2000mg; Biotin, 10,00mg; Vitamin B₁₂, 3000mg; Folic acid, 1500mg; Choline Chloride; 60,000mg, Manganese, 10,000mg Iron, 1500mg; Zinc, 800mg; Copper, 400mg; Iodine, 80mg; Cobalt 40mg; Selenium, 8000mg.

Table 2: Carcass and Internal organ yield of broiler finishers fed toasted sorrel seed

Parameters	Diets/Treatments					SEM
	T1	T2	T3	T4	T5	
No. of birds slaughtered	3		3	3	3	3
Av. Live weight (g)	1428.33 ^{ab}	1351.66 ^b	1856.66 ^b	1560.00 ⁶⁶	1483.33 ^{ab}	137.52 [*]
Slaughtered weight (g)	1689.66 ^{ab}	1340.00 ^c	1833.33 ^a	1526.66 ^{bc}	1456.66 ^{bc}	70.82 [*]
Dressed weight (g)	943.93	921.80	1187.60	1044.80	1004.70	85.50 ^{NS}
Dressing %	66.27 ^{ab}	68.28 ^a	64.16 ^b	67.07 ^{ab}	67.74 ^a	0.96 [*]
Head weight (g)	72.23	52.76	56.96	62.36	55.20	8.49 ^{NS}
Neck weight (g)	62.46	87.16	89.90	82.30	90.20	12.53 ^{NS}
Thorax weight (g)	141.36	134.46	143.70	154.00	158.23	15.66 ^{NS}
Breast weight (g)	300.26	310.66	310.96	316.33	290.63	47.19 ^{NS}
Back weight (g)	185.53	208.63	171.76	193.16	158.43	32.22 ^{NS}
Wings weight (g)	153.23	155.16	160.96	164.63	191.80	18.32 ^{NS}
Thighs weight (g)	224.53	213.03	205.73	259.80	228.70	25.70 ^{NS}
Drumstick weight (g)	155.30	155.83	197.16	204.10	191.53	17.22 ^{NS}
Shanks weight (g)	79.23	49.30	83.96	94.80	87.13	13.98 ^{NS}
Internal organs						
Liver weight (g)	31.16	23.20	45.93	40.40	44.93	7.98 ^{NS}
Full gizzard wgt (g)	79.36	43.46	82.10	76.30	69.60	6.23 ^{NS}
Full intestine wgt (g)	101.36	51.36	6.80	73.26	83.26	21.21 ^{NS}
Abdominal fat wgt (g)	33.26	35.86	46.93	30.43	27.03	14.67 ^{NS}

a,b,c, = means within the same raw bearing different superscripts differ significantly (P>0.05)

Table 3: Proximate Composition of Toasted Sorrel seed (TSM)

Nutrient	%
Moisture	2.30
Crude Protein	22.80
Crude Fiber	4.70
Ether Extract	4.00
Ash	14.20
NFE	52.00



Table 4: Proximate Composition of the experimental Broiler Finisher diet

Nutrient (%)	Finisher diet					TSSM
	T1	T2	T3	T4	T5	
Moisture	2.4	2.3	2.3	2.0	2.2	2.30
Crude Protein	22.6	22.8	23.1	24.0	25.0	22.80
Crude Fiber	4.2	4.2	4.5	5.5	6.5	4.70
Ether extract	5.0	5.4	5.5	6.0	5.5	4.00
Ash	5.4	5.6	6.0	4.0	4.2	14.20
NFE	60.4	59.7	58.6	57.5	56.6	52.00
ME	3385.40	3400.35	3380.50	3415.25	3379.80	3013.60

Calculated ME: (Kcal/kg) = $37 \times \%CP + 81 \times \%EE + 35.5 \times \%NFE$ (Pauzenga, 1985)