



Hematological and Biochemical Indices of Broilers Finisher Chickens Fed Toasted Sorrel Seed Meal (*Hibiscus Sabdariffa*) as Replacement for Groundnut Cake

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ABSTRACT

One hundred and fifty (150) Anak- 2000 white strain broiler finisher chickens were used to evaluate the effects of Sorrel (*Hibiscus sabdariffa*) seed meal (TSSM) on hematological and biochemical indices of broiler chickens. Five experimental diets were formulated and sorrel seed meal was incorporated to replace groundnut cake at 0%, 15%, 20% 25% and 30% representing T1, T2, T3, T4 and T5 respectively. The broiler finishers were randomly allocated to five dietary treatments consisting of three replication of ten birds per replicate in a completely randomized design (CRD). The proximate composition of the toasted sorrel seed meal revealed crude protein 22.80, crude fiber 4.70, ether extract 4.00 and nitrogen free extract 52.00% respectively, proximate composition of the experimental diets shows that the crude protein and energy could support the performance of birds. The hematological parameters showed significant ($P>0.05$) difference except for RBC, WBC, MCV and MCH, while the biochemical parameters showed significant ($P>0.05$) difference except for protein and creatinine. It was concluded that 20% sorrel seed meal as replacement for groundnut cake meal without achieve effect on blood parameters.

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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 used 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 performance 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

Hematological and Biochemical Analysis

At the end of the experiment, three birds were blood was collected from the wing vein of each bird into sterilized bottles containing Ethylene-diaminetetra acetic acid (EDTA) for hematological parameters determination as described by (Schrews, 2000). The data generated from the blood analysis were used to calculate the erythrocytic parameters which include the mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), and mean corpuscular haemoglobin concentration (MCHC) as described by (Sirois, 1995). Similarly, 5mls of blood samples were collected into sterilized bottles without (EDTA) for biochemical analysis parameters determined were glucose, total protein, globulin, albumin, cholesterol and creatinine.



CHEMICAL 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) (Duncan, 1955).

RESULT AND DISCUSSION

The results of hematological and biochemical parameters are shown in table 2. The hematological parameters showed significant ($P>0.05$) difference for RBC, WBC, MCV and MCH, while the pack cell volume (Rbc) was not significant ($P>0.05$) among treatments but with the range of 25-29% which fell within the normal range of 27.0-35.0% as reported by (Aeungwanich et al., 2004) for broiler chickens. According to (Oyawoye and Ogunkunle, 1998) a reduction in the concentration of PCV in the blood in an indication of the presence of a toxic factor which has determines effect on blood formation, the Hb and PCV obtained in this study agreed with the assertion of (Amuefule and Nwaokoro, 2002) which shows that the diet contained relatively higher quality protein that can meet the birds protein requirement.

The Wbc obtained in this study fell below the reference range of $9-31 \times 10^3/\text{mm}^3$ for healthy bird. Decreased Wbc as asserted by (Reitman and Frankel, 1957) below the normal ranges in indication of allergic conditions, anaphylactic shock and certain parasitism or presence of foreign body in circulating system. Cholesterol with the values ranges of 1.76 – 3.73mg/dl were low, but could be attributed to the presence of phytate and tannins, although tannins not detected in this study but could have trace presence which might have interfere with the absorption of dietary lipids and cholesterol resulting in overall cholesterol lowering effect. Jenkin and Atwal (1994) reported that tannin in diets have been known to reduce the update of certain nutrients like glucose and cholesterol and help in reducing the metabolic burden that would have been placed on the liver, the values of glucose, globulin, albumin shows significant ($P>0.05$) difference since the total protein and albumin are indication of the total protein reserves in an animal as reported by Bamgbose

et al., (2003), the lack of significant differences in the serum protein in all the dietary treatments shows the adequacy of the dietary protein creatinine values suggested muscular wastage and hence birds living on body reserve. The sources and type of dietary protein was found to influence serum creatinine and uric acid significantly increases (Bamgbose, 2003).

CONCLUSION

From the result obtained in this study, it can be concluded that broiler chickens can be fed toasted sorrel seed meal with an inclusion level of 30% without adverse effects on blood profile parameters.

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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: Hematological and Biochemical indices of Broiler chickens fed varying levels of TSSM

Parameters	Diets/Treatments					SEM
	T1 (0%)	T2 (15%)	T3 (20%)	T4 (25%)	T5 (30%)	
PCV (%)	27.00	29.00	27.33	26.00	25.00	1.55 ^{NS}
RBC (x10 ⁶ mm ³)	4.90 ^a	4.83 ^a	3.86 ^b	4.36 ^{ab}	4.83 ^a	0.15 [*]
WBN (x10 ⁶ mm ³)	3.36	1.63 ^b	1.53 ^b	2.23 ^{ab}	2.06 ^b	0.36 [*]
Hb (g/dl)	8.60	9.13	8.86	8.36	8.50	0.55 ^{NS}
MCV (fl)	5.20 ^b	5.53 ^b	7.00 ^a	5.86 ^b	5.13 ^b	0.28 [*]
MCH (pg)	17.76 ^b	18.50 ^b	22.56 ^a	19.33 ^{ab}	17.56 ^b	1.02 [*]
MCHC (%)	33.03	32.93	32.76	33.03	33.16	0.40 ^{NS}
Biochemical Indices						
Glucose (mg/dl)	7.20 ^c	10.40 ^{ab}	8.70 ^{bc}	12.36 ^a	12.96 ^a	0.79 [*]
Protein (mg/dl)	26.13	28.30	22.13	22.16	26.00	1.75 ^{NS}
Globulin (g/dl)	12.73 ^{ab}	15.26 ^a	8.76 ^b	8.26 ^b	16.53 ^a	1.79 [*]
Albumin (g/dl)	13.13 ^a	11.43 ^{ab}	12.36 ^a	13.83 ^a	9.40 ^b	0.76 [*]
Cholesterol (mg/dl)	2.23 ^{ab}	1.80 ^b	1.76 ^b	3.73 ^a	1.80 ^b	0.47 [*]
Creatinine (mg/dl)	57.40	55.13	58.86	60.93	61.96	3.91 ^{NS}
a,b,c, =	Means within the same raw bearing different superscripts differ significantly (P<0.05)					
* =	Significant (P<0.05)					
NS =	Not significant (P>0.05)					
SEM =	Standard Error of Mean					

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 Starter and Finisher diet

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

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