

EFFECT OF DIETARY INCLUSION OF TOASTED COTTON SEED CAKE MEAL ON THE PERFORMANCE AND HAEMATOLOGICAL PROFILE OF BROILER CHICKEN AT STARTER PHASE

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Abstract

A feeding trial was conducted to investigate the effect of dietary inclusion of toasted cotton seed cake meal (TCSCM) on the performance and haematological profile of broiler chickens (0-5 weeks). Five diets were formulated in which TCSCM was included at graded levels of 0, 7.5, 15, 22.5 and 30% designated as T1, T2, T3, T4 and T5 respectively. A total of Ninety (90) day old broiler chicks (Anak Strain) were fed diets in a completely randomized design (CRD) and each treatment was replicated three times with 6 birds per replicate. The experiment lasted 5 weeks. The samples of the blood were collected via wing vein using 2ml syringe and analyzed in the laboratory for haematological indices. The results of the performance showed there were significant differences ($P < 0.05$) in the final body weight (610.89-944.45g), daily weight gain (20.66-32.60g) and daily feed intake (59.15- 63.32g) of birds. The feed conversion ratio was significantly ($P < 0.05$) recorded better for broiler chicks fed 15% toasted cotton seed cake meal diet (1.95) compared to others. Results of haematology indicated that there were significant differences ($P < 0.05$) in the packed cell volume, haemoglobin and red blood cells counts. The values obtained were within the normal range for normal healthy birds. It was concluded that 15% dietary inclusion of toasted cotton seed cake meal is adequate for optimum performance and healthy condition of broiler chickens.

Key words: Broiler chicks, performance and haematological profile.

Introduction

The ever increasing cost of conventional protein feedstuffs for livestock has immensely contributed to the downward production and intake of animal protein in Nigeria. The source of cheap alternative feedstuffs without compromising the quality of the feed, productive performance of the birds and the economics of production is the main challenges of nutritionist. Several oil seeds have been investigated for this purpose (Cable *et al.*, 2007). Cotton seed cake is a by-product of the textile industry which is in abundance yet its utilization as feed ingredients for poultry is limited due to gossypol (anti-nutrients) content. It is polyphenolic pigment which implicated protein digestion (Adeyemo and Longe, 2007). Cotton seed cake has shown as promising plant protein that can substitute the conventional ones (Fernandez *et al.*, 2001). Cotton seeds cake contains 36.15% protein 19.96% fiber and 14.42% fat. The objective of this study was to determine the effect of feeding toasted cotton seed cake meal on the growth performance and haematological profile of broiler chicks.

Materials and methods

Experimental Site

The experiment was conducted at Teaching and

Research Farm of the Department of Animal Science, Faculty of Agriculture and Agricultural Technology, Kano University of Science and Technology, Wudil. It is located within Sudan savannah region of northern Nigeria. The farm is located on latitude $11^{\circ}37'N$ and longitude $8^{\circ}58'E$ at an altitude of 403m above the sea level. The annual rainfall ranges from 850mm 870mm. (Olofin *et al.*, 2008).

Experiment Diet and Design

Five diets were formulated using toasted cotton seed cake meal at graded levels of 0, 7.5, 15, 22.5, and 30%. The diets were designated as Treatments 1, 2, 3, 4 and 5 respectively. Sample toasted cotton seed cake meal and diets were chemically analyzed in the laboratory for proximate composition according to A.O.A.C. (1990). The TCSCM gave 31.56% crude protein and 13.23% crude fibre. Diets were assigned and allotted to birds in completely randomized design (CRD). Each treatment was replicated three times and fed to 18 birds with 6 birds per replicate.

Experimental birds and their management

A total of 90 day old chicks (Anak strain) were used in the experiment. The birds raised in deep litter house partition into pens made up of wooden frame and wire mesh. The chicks were weighed and randomly allocated into pens. Water was supplied *ad libitum*. The birds are vaccinated

against *Gumboro* and *Newcastle disease* at 2 weeks and 3 weeks respectively. Routine operation such as cleaning of the house and checking of the physical condition of the birds were carried out on daily basis. A broad spectrum of anti-biotic (Keprocyll) and anti-coccidia (Amprolium) were given to the birds at 2 and 3 Weeks respectively. The mortality rate were recorded as occurred.

Data Collection

The feeds were offered daily and the left-over of diets were weighed on daily basis to determine the feed intake per day. Water was supplied *ad-libitum*. The birds were weighed weekly and the weight gains were determined by subtracting the initial weight from the final weight within the period. Samples of blood were also collected at age of four weeks in bottles containing anti-coagulant ethylene diamine tetraacetic acid (EDTA). The blood Samples were evaluated at haematology unit of the Department of pathology, Faculty of veterinary medicine, Ahmadu Bello University, Zaria. The experiment lasted four weeks.

Data Analysis

The data collected were subjected to analysis of variance in a Statistical analysis system package (SAS, 2002) where significant differences exist, means were separated using Duncan Multiple Range Test (DMRT).

Results and Discussion

The results of performance of broiler chicks are presented in Table 2: The results showed that there were significant differences ($P < 0.05$) in the final body weight, daily weight gain and daily feed intake of birds. Birds fed 15% toasted cotton seed cake meal had the highest final body weight (944.45g) and lowest value was recorded for those fed 30% TCSCM diet (610.89g). The daily weight gain followed the same pattern in which birds fed treatment 3 gained more weight compared to others. This agreed with work of Adeyemo and Longe (2007) who reported that feeding cotton seed cake diets increased weight gain of broilers. This also conquered with the work of Emiola *et al.* (2003) and Akanji (2002) who reported processing improves utilization of oil seed cakes by preventing formation of protein-iron complexes that may inhibit the digestion of protein. However, the daily feed intake was recorded higher for birds fed control diet and 7.5% TCSCM diets. The feed conversion ratio was better for chicks fed 15% TCSCM diet and worst for those fed diet containing 30% TCSCM. This agreed with Olomu and Offiong (1980) who

reported better feed conversion ratio as the quality of dietary protein improved.

The results of haematology are presented in Table 3. The results revealed that there were significant differences ($P < 0.05$) in the packed cell volume, haemoglobin and red blood cells count. Packed cell volume was recorded higher for 22.5% TCSCM diet compared to others. The PCV value are within the normal range of birds and this indicated the good health status of birds as low PCV values are taken to indicate anaemia (Adejimi *et al.*, 2000). The haemoglobin and red blood cell count were found to be highest for birds fed 15% TCSCM diets (8.61 g/dl and 4.98 ($\times 10^6/\mu\text{l}$) respectively. This shows an appreciable oxygen carrying capacity in birds in which transport of nutrients by blood was not impaired by feeding toasted cotton seed cake. No significant difference ($P > 0.05$) for total protein and white blood cells count. However, the percentage lymphocytes and monocytes were significantly ($P < 0.05$) influenced by the dietary treatments. This indicated that phagocytosis was not impaired by the dietary treatments.

Conclusion

Based on this study, it was concluded that toasted cotton seed cake meal can be included in the diet of broiler chicks up 15% without any depression in the performance and haematological profile.

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Table 1: Composition of Broiler Starter Diets Containing Toasted Cotton seed cake meal (TCSCM)

Ingredients	Treatments				
	T1 (0%)	T2 (7.5%)	T1 (15%)	T1 (22.5)	T1 (30%)
Maize	54.38	53.40	53.13	55.21	51.15
Soya bean meal	32.12	25.60	18.37	11.90	5.38
TCSCM	0.00	7.50	15.00	22.50	30.00
Fish meal	3.50	3.50	3.50	3.50	3.50
Wheat offal	6.00	6.00	6.00	6.00	6.00
Bone meal	3.00	3.00	3.00	3.00	3.00
Salt	0.30	0.30	0.30	0.30	0.30
Lysine	0.25	0.25	0.25	0.25	0.25
Methionine	0.20	0.20	0.20	0.20	0.20
Vitamin -premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated Analysis					
Crude protein (%)	23.00	23.00	23.00	23.00	23.00
M. Energy Kcal/kg	2995	2961	2929	2916	2912
Crude fibre	3.33	3.61	5.10	6.16	7.11

Table 2: Performance of broiler chickens fed Toasted cotton seed cake meal based diets at starter phase 0-5 weeks.

Ingredients	Treatments					SEM
	T1 (0%)	T2 (7.5%)	T1 (15%)	T1 (22.5)	T1 (30%)	
Initial body weight (g)	32.32	32.42	31.89	31.79	32.44	0.55
Final body weight (g)	938.33 ^a	922.22 ^{ab}	944.45 ^a	877.78 ^b	610.89 ^c	14.64
Daily weight gain (g)	32.36 ^a	31.76 ^{ab}	32.60 ^a	30.25	20.66 ^c	0.76
Daily feed intake (g)	65.52 ^a	64.47 ^a	63.32 ^b	61.59 ^c	59.15 ^c	0.85
Feed conversion ratio	2.02 ^b	2.07 ^b	1.95 ^a	2.07 ^b	2.87 ^c	0.87
Mortality rate (%)	0.00	0.11	0.00	0.00	0.11	0.05

^{abc} means with different superscripts are significantly different (P<0.05)

SEM = Standard Error of means

Table 3: Haematological and some serum profile of broiler chickens fed toasted cotton seed cake

Parameters	Treatments					SEM
	T1 (0%)	T2 (7.5%)	T3 (15%)	T4 (22.5)	T5 (30%)	
Packed cell volume (%)	27.13 ^b	24.31 ^c	22.12 ^c	29.01 ^a	27.28 ^b	0.42
Haemoglobin (g/dl)	8.08 ^b	8.41 ^b	9.21 ^a	8.61 ^{ab}	8.36 ^b	0.48
Red blood cells (X10 ⁶ /μl)	4.26 ^b	3.77 ^c	4.98 ^a	4.25 ^b	4.30 ^b	0.28
Total protein (g/dl)	3.24	3.87	3.47	3.38	3.69	0.38
White blood cells X10 ⁶ /	2.98	2.97	3.28	2.14	2.10	0.54
Lymphocytes (%)	59.34 ^b	53.34 ^c	62.34 ^a	52.67 ^c	54.00 ^c	1.89
Neutrophils (%)	32.00	32.00	35.67	32.00	35.00	1.33
Monocytes (%)	2.700 ^{ab}	1.967 ^b	3.217 ^a	3.154 ^a	2.767 ^{ab}	0.29
Eosinophils(%)	1.30	1.36	1.50	1.20	1.13	0.201

^{abc} means with different superscripts are significantly different (P<0.05)

SEM = Standard error of means