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Performance and carcass characteristics of broiler chicken fed high fibre sunflower seed cake diets

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Abstract

A feeding trial was conducted to assess the levels of inclusion of high fibre sunflower seed cake (HFSSC) protein as replacement for soybean cake protein in the diets of broiler chicken at 0,25,50,75 and 100%. At the starter phase feed intake and feed efficiency ratio were significantly (P<0.05 increased as the level of HFSSC increased in the diets. Weight gain and protein efficiency ratio were however significantly (P<0.05) reduced when over 25% of HFSSC was included in the diet. At the finisher phase the same trend was observed except that weight gain and protein efficiency ratio were significantly (P<0.05) reduced when over 50 % HFSSC was included in the diet. Significant (P<0.05) differences were observed in live weight, plucked and dressing percentages at the starter and finisher phases. Reduction in abdominal fat deposition was obtained at the starter and finisher phases while gizzard weights were significantly (P<0.05) increased. The results of this study show that 50% soybean cake protein in the diets of broiler chicken can be replaced by HFSSC.

Keywords: High fibre sunflower cake, broiler, performance

Introduction

The expansion of Nigerian commercial poultry production has great potentials in improving animal protein status of the Nigerian populace. However, the provision of feed in the right quality and quantity (especially that of protein and energy) presents a great threat to the realization of this goal. The rapid decline in the cultivation and utilization of the conventional oil seed plants in oil production has led to research into other sources of protein and energy, locally grown with less competition to alleviate poultry production problems and consequently improve the nutritional status of the average Nigerian.

Sunflower seed has been identified as a potential alternative source of vegetable oil which can be grown in great variety of soil (Ogunremi 1979, Abudullahi and Ado 1985 and 1988), tolerate low fertility than maize and sorghum, and can also be grown where soybean (Balloun, 1980) can not be grown. These suggest great potential for its increased cultivation and production of its cake. Also the oil (particularly essential fatty acids), rich methionine level as well as several B- complex vitamins (Green *et al.*, 1987, Day and Levin 1954) which are limiting in other plant proteins are incentives for its utilization in poultry feeds.

However, of major concern are earlier works by Nowland *et al.*, (1981), Adeniji and Ogunmodede (2000) who reported that the nature and content of sunflower's fibre impose limitation on the utilization of its nutrients. Therefore this study was designed to assess the effect of constant higher oil levels on the performance and carcass characteristics of broiler chicken feed high fibre (22%) sunflower seed cake.

Materials and Methods

Dietary treatments.

Pressed high fibre sunflower seed cake (HFSSC) used for this study were obtained from Tallon Nigeria Limited, Lagos. Ten experimental diets were formulated, five diets at the starter phase which lasted for five weeks and another five diets at the finisher phase which lasted for four weeks.. The protein supplied by soybean cake in the control diet (0% HFSSC) was taken to be 100%. In the other diets HFSSC was used to replace 25, 50 75 and 100% of the protein supplied by soybean cake. Table 1 shows the percentage composition of the diets and test ingredients.

Management of birds

A total of 225 unsexed day-old Anak broiler chicks were used. They were randomly allocated to the five treatments and their replicates giving 15 chicks to each replicate and 3 replicates per treatment. The birds were housed in 5 different compartments, such that each treatment is replicated in each compartment in a randomized complete block design. Birds were kept in battery brooders for the first three weeks and were later transferred to deep litter pens. Feed and water were supplied *ad libitum*.

Parameters measured

At the beginning of the experiment the chicks were weighed as individual replicate groups. Weekly feed intake and weight gain were recorded from which feed conversion ratio (FCR) and protein efficiency ratio (PER) were calculated. Carcass evaluation was carried out at the 5th and 9th week, 2 birds per replicate were randomly picked, fasted overnight and slaughtered by severing the jugular vein. After scalding in warm water for about a minute, the feathers were manually plucked, each bird was cut into parts for carcass evaluation. The relative weight was calculated by expressing the weight of the cut part as percentage of dressed weight. The cut up values, gizzard and abdominal fat values were transformed using square root transformation before they were statistically analyzed.

Chemical and statistical analysis

Test ingredient and diets were analyzed for proximate composition using methods of A.O.A.C (1990), while metabolisable energy was calculated by the WPSA (1985) method. Data were analyzed using analysis of variance as described for randomized complete block design (Steel and Torrie 1980). Significant differences were determined by the use of Duncan's multiple range test (Duncan, 1955).

Results and Discussion.

Table 3 shows the performance characteristics of the birds fed the experimental diets. There were significant ($P<0.05$)differences in all the performance characteristics measured at both phases of the experiment. At the starter phase the inclusion of HFSSC above 25% significantly ($P<0.05$) reduced the efficiencies of feed and protein utilization, which is reflected in reduced weight gain almost commensurate to the level of HFSSC added. While at the finisher phase, the same trend was observed when over 50% HFSSC was included in the diets of broiler chicken.

The lower performance of broiler chicken observed at the starter phase with HFSSC diets could be a reflection of the stringent requirement for essential nutrients (protein and energy) at

Table 4: Carcass characteristics of birds fed high fibre sunflower seedcake

Level of HFSSC (%) Parameters	0	25	50	75	100	SEM
Starter phase						
Live weight (g)	634.65^{a}	655.75^{a}	593.85^{b}	523.26^{c}	387.20^{d}	12.25
Plucked weight(%)	85.75^{ab}	81.02^{b}	85.38^{ab}	89.51^{a}	82.06^{b}	1.48
Dressing (%)	57.53^{a}	54.75^{ab}	55.24^{ab}	52.07^{c}	53.53^{bc}	0.85
Breast (% of dressed weight)	4.76	4.69	4.85	4.75	4.77	0.04
Back (% of dressed weight)	4.45	4.51	4.48	4.48	4.39	0.03
Abdominal fat (% of dressed weight)	0.88^{a}	0.80^{a}	0.83^{a}	0.00^{b}	0.00^{b}	0.09
Gizzard (% of dressed weight)	2.27^{b}	2.15^{b}	2.18^{b}	2.72^{a}	2.61^{a}	0.04
Finisher phase						
Live weight (g)	1883.70^{a}	1664.73^{b}	1818.89^{a}	1513.02^{c}	1517.66^{c}	26.09
Plucked weight (%)	89.95^{bc}	87.95^{c}	92.74^{a}	94.08^{a}	91.41^{ab}	0.78
Dressing (%)	67.59^{ab}	66.58^{bc}	68.55^{a}	65.01^{c}	67.70^{ab}	0.54
Breast(% of dressed weight)	5.05	4.99	4.87	4.98	4.73	0.06
Back (% of dressed weight)	4.39^{c}	4.47^{ab}	4.49^{ab}	4.52^{a}	4.42^{bc}	0.02
Abdominal fat (% of dressed weight)	1.54^{a}	1.27^{ab}	0.55^{d}	0.89^{cd}	1.17^{bc}	0.10
Gizzard(% of dressed weight)	1.99^{cd}	1.95^{d}	2.13^{bc}	2.31^{a}	2.26^{ab}	0.04

a,b,c : Mean in the same row followed by different superscripts differ significantly ($P<0.05$).
SEM – Standard error of means.

Abdominal fat seems to suggest that the availability of nutrients were impaired by high fibre content of the HFSSC. The limitation was more pronounced as the level of HFSSC increased. This might be an incentive to both producers and consumers, as less wastage and tougher broiler are anticipated due to the low fat deposition in the broiler chicken. The gizzard weight is determine by the amount of work required of the muscular wall of the organ to comminate feed particles (Abdelsamie and Panaweera 1983, Johnson and McNab, 1983). HFSSC is gritty and fibrous in nature requiring extra work in communing the feed particles, consequently the significant gizzard weight obtained from this study.

Conclusion

Generally, the results obtained from this study seem to point to the fact that optimal calorie to protein ratio required for efficient utilization of HFSSC protein was yet to be met. Though the cake seems adequate in protein, the high fibre content prevented effective utilization through its effect on available nutrients, particularly energy. Conclusively, the results obtained in this study suggest that not more than 50% of protein supplied by soybean in broiler diet can be replaced by HFSSC protein.

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This paper originally published in year 2004 Vol.31(2): 174-181, is republished here because of serious mix-up of the tables. The mistake is highly regretted.