

Performance characteristics of broiler finisher fed grit and enzyme supplemented sugarcane bark scrapings

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ABSTRACT: A total of two hundred and seventy (270) broiler finishers of four (4) weeks old were used in this experiment to determine the effects of feeding Sugarcane Bark Scrapping (SBS) with or without grit and enzyme supplementation. A 3 × 3 factorial experiment was adopted such that there were three graded levels of SBS (0, 7.5 and 15%) by three supplementation levels (No supplement, grit and enzyme) and lasted for a period of four (4) weeks. The results showed that increase in the inclusion level of SBS had significant effect ($P < 0.05$) on the rate of weight gain, feed intake, feed to gain ratio, final body weight, cost of feed consumed per bird, rearing cost and nitrogen retention but had no significant effect ($P > 0.05$) on the nitrogen intake. There were significant effects ($P < 0.05$) of the supplementation on the feed intake, rate of weight gain, feed to gain ratio and final body weight. Broiler finishers fed grit supplemented diets performed significantly ($P < 0.05$) better than broiler fed no supplement and enzyme supplemented diets. The interaction between the varying levels of SBS and supplements had significant effects ($P < 0.05$) on final body weight, rate of weight gain, feed intake and feed to gain ratio. This study shows that broiler fed SBS at 7.5% inclusion level supplemented with grit gave the best growth performance.

Keywords: Broiler, enzyme, grit, performance, sugarcane back scrapings.

INTRODUCTION

Livestock production is a major contributor to food and nutrition security all over the world. However, a major limiting factor to livestock production is the high cost of feeds, resulting from high cost of conventional feedstuffs. Livestock feeds account for 60 to 80% of the total cost of production especially in monogastric animals (Tewe, 1997). Unfortunately, prices of livestock feed are going up daily due to increase in the prices of conventional feedstuffs like maize, groundnut cake and soybean to mention a few. Production cost cannot be reduced without sourcing for alternative, cheap and readily available feedstuffs to replace the expensive conventional feedstuffs. The need for non-conventional feedstuffs in the diets of livestock cannot be overemphasized and the search for cheap feedstuffs has led to researches in rice husks, poultry litter, rumen content, etc.

According to Ayoade et al. (2007) one of such non-conventional feedstuffs is sugarcane bark scrapping waste which littering both urban and rural settlements thereby

constituting environmental dirt. Livestock such as cattle, sheep and goat scavenge these residues. The poor response of monogastric animals to the use of agro-industrial byproducts and waste such as sugarcane back scrapping could be traced to high fibre and low metabolized energy content of these by-products (Atteh, 2000). To make these cheap, high fibre, low energy wastes acceptable to these animals one has to augment these by-products with high energy sources or breakdown the fibre to release more energy for the animals.

Grits are hard bits of stones and small sand particles utilized by birds in the gizzard to aid abrasion (Adeniji and Oyeleke, 2008). Grits can be classified into soluble and insoluble grits. The soluble grits include limestone and oystershell; which are easily dissolved in gizzard and serve as sources of minerals and calcium. The insoluble grits include silica and mica which are non-digestible and are retained in the gizzard. Adeniji and Oyeleke (2008) reported that birds can tolerate up to 5% grits in their diet

and it also improves the efficiency of feed utilization by the birds.

Thus, the objective of this study is to determine the effects of feeding Sugarcane Bark Scrapping (SBS) with or without grit and enzyme supplementation.

MATERIALS AND METHODS

Experimental site

The study was conducted at the poultry unit of the University of Abuja Teaching and Research Farm. The project site lies between latitude 81°55'N and 90°E and longitude 70°N and 70°SE. Annual rainfall ranges from 1,145 to 1,631 mm

Source and processing of test ingredients

Sugarcane bark scrapping were collected at sugarcane sales and processing sites in Gwagwalada. After collection, they were sun dried to moisture content below 12% then pounded with mortar and ground to particle size adequate for poultry feeding. Other feed ingredients were purchased from a reputable livestock feed store in the project area.

Experimental design, diet and bird's management

A total of 270 broiler birds of four weeks old were used for this study. These were fed on commercial broiler starter from 0 to 3 weeks. The experimental diets (finisher's feed) were started from four weeks. The broilers were housed in battery tier cages designed for poultry. There was nine (9) experimental diets of graded levels of sugarcane bark scrapping at 0, 7.5 and 15% and each had three supplemented levels (No supplement, grit and enzyme) (Table 1). The experiment was a 3 X 3 factorial arrangement in a completely randomized design with 3 levels of SBS (0, 7.5 and 15%) and 3 types of supplementation (No supplement, grit and enzyme). Each of the nine (9) diets had three replicate group each with 10 birds per replicate. The experimental diets and water were given *ad libitum* while standard managerial procedures are followed throughout the period of the experiment.

Data collection and analysis

Parameters measured included initial body weights (g/bird), final weight (g/bird), body weight gain (g/bird), feed intake (g/bird) and feed conversion ratio. Initial live body weight of the birds were measured at commencement of the experiment and was used to calculate the final body weight, feed intake was calculated as the difference between feed given and feed left over were taken, weight gain was determined as the difference between weight of the birds from the previous week, feed conversion ratio was calculated by dividing the average feed intake by the

average weight gain:

$$\text{Fed to gain ratio} = \frac{\text{feed intake}}{\text{Body weight gain}}$$

Nutrients retention trial was conducted in the last three days of the feeding trail. The total faecal collection method was adopted in which faecal samples were collected over three days period, dried, weighed and analyzed.

$$\text{Percentage retention} = \frac{\text{nutrient intake} - \text{nutrient output}}{\text{Nutrient intake}} \times 100$$

Proximate compositions of the feed and faecal samples were analysed using the methods as described by AOAC (1995). All data were subjected to analysis of variance (ANOVA) using the factorial arrangement in a completely randomized design. The SPSS 19 package was used and significant differences between means were compared using the Duncan's Multiple Range Test (Steel and Torrie, 1980)

RESULTS

Growth performance of broilers fed on sugar cane back scrapings with or without grit and enzyme supplementation are presented in Table 2. The treatment had significant effect ($P < 0.05$) on the final body weight of the broilers. Birds fed with 7.5% SBS had the highest ($P < 0.05$) final body weight while broilers on the 15% SBS had the lowest final body weight. Broilers fed grit supplemented diets gave the best final body weight which was higher than broilers on the enzyme diets; while birds fed no supplementation had the lowest ($P < 0.05$) final body weight. It is obvious that birds on the supplementation diets had a higher final body weight than those on the unsupplemented diets.

The feed intake significantly increased ($P < 0.05$) with the inclusion of SBS in the diet. The control diets had the lowest ($P < 0.05$) feed intake value. The broilers on the grit based diets had the highest ($P < 0.05$) feed intake, while the birds fed with enzyme had significantly lower ($P < 0.05$) feed intake. The broilers on the 7.5% SBS diets had highest ($P < 0.05$) rate of weight gain; birds on the control diets similarly had a higher ($P < 0.05$) rate of weight gain while birds on the 15% SBS had the lowest rate of weight gain. There were significant effects of supplementation on the rate of weight gain. Grit and enzyme supplemented diet had significantly higher ($P < 0.05$) rate of weight gain than birds on the non-supplemented diets. The boilers fed with 7.5% SBS and supplemented diets had the best ($P < 0.05$) feed to gain ratio.

DISCUSSION

Utilization of SBS in livestock feed will go a long way in the improvement of the environmental and sanitary conditions

Table 1. Composition of experimental diet (kg/100kg).

Ingredients	0% SBW			7.5% SBW			15% SBW		
	T 1	T2	T3	T 4	T5	T 6	T7	T 8	T9
Maize	45	45	45	45	45	45	45	42	45
Wheat bran	22	10.5	22	12.5	2.5	12.5	4.5	0	4.5
SBS	0	0	0	7.5	7.5	7.5	15	15	15
Grit	0	7.5	0	0	7.5	0	0	7.5	0
Enzyme	0	0	EZM	0	0	EZM	0	0	EZM
GNC	20.5	24.5	20	22.5	24	22.5	22	20	22
Fish meal	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Blood meal	2.5	2.5	2.5	2.5	2.5	2.5	3.5	3.5	3.5
Bone meal	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Limestone	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Salt	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Lysine	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total	100	100	100	100	100	100	100	100	100
Analyzed Values									
Moisture	11.51	11.32	11.40	11.45	11.50	11.43	11.33	11.44	11.45
CP (%)	21.18	21.03	21.18	21.16	20.93	21.16	21.05	20.71	21.05
CF (%)	4.22	4.37	4.31	4.85	4.90	4.98	5.61	5.69	5.65
EE (%)	3.91	3.89	3.81	3.72	3.69	3.70	3.58	3.52	3.56
Ash (%)	6.56	6.65	6.42	6.36	6.12	6.34	6.33	6.54	6.44
M.E (Kcal/kg)	2714	2715	2713	2611	2622	2613	2568	2571	2554

Bio mix finisher (BIO-ORGANIC) Premix used contain the following per kg: Vit. A: 8,000,000 IU, Vit. D3: 1,500,000, Vit. E: 7,000 mg, Vit. K: 1,500 mg, Vit. B1: 2,000 mg, V. B2:2,500 mg, Niacin: 15,000 mg, Pantothenic acid: 5,500mg, Vit. B6: 2000 mg, Vit. B12: 10mg, Folic acid: 500 mg, Biotin Hg: 250 mg, Choline chloride: 175,000 mg, Cobalt: 175,000 mg, copper: 3,000 mg, Iodine: 1000 mg, Iron: 21,000 mg, Manganese: 40,000 mg, Selenium: 200 mg, Zinc: 31,000mg, Antioxidant: 1,250mg.

Table 2. Growth performance of broilers fed sugar cane bark scrapping with or without grit and enzyme supplementation.

Dietary Treatments	Initial body weight g/g/b	Final body weight	Fated intake g/b/d	Rate of gain g/b/d	Feed to gain ratio
Levels of SBC (%)					
0	440	1833 ^b	100.43 ^a	49.75 ^b	2.02 ^b
7.5	433	1894 ^a	103.26 ^{ab}	52.18 ^a	1.98 ^a
15	443	1760 ^c	106.05 ^b	47.04 ^b	2.25 ^c
SEM	0.002	1.584	0.057	0.027	0.002
Significance	NS	*	*	*	*
Supplements					
NSA	440	1733 ^b	100.02 ^a	46.18 ^a	2.17 ^b
Grit	440	1801 ^a	102.12 ^b	48.61 ^a	2.10 ^a
Enzyme	437	1753 ^b	99.60 ^a	47.0 ^a	2.12 ^a
SEM	0.03	0.341	0.055	0.025	0.023
Significance	NS	*	*	*	*
SBC X Supplement interaction	NS	*	*	*	*

abc: Treatment means in the same column, (with a particular criterion) having different superscripts letters, are significantly different ($P < 0.05$). NS = Non significant ($P > 0.05$), SEM = Standard error of means, SBS = sugar cane bark scrapping, NSA = No supplement added.

of our cities; and particularly sugar cane producing and selling areas. This SBS is just deposited on the floor, not packed and difficult to burn. Feed intake significantly increased with SBS in the diet. Adeniji (2009) also made similar observation when palm kernel cake (PKC) and grit were fed to pullet chicks. SBS is high in fiber (12.7%) and fibers have been reported to increase feed intake (Mateos et al., 2012). Birds on grit based diets had increased feed intake even more than those fed with enzyme supplemented diets. This could be due to the extra functions provided by grit in the gizzard that allow the crop to be empty and induce the chicken to increase feed intake.

The best feed ratio was obtained on the 7.5% SBS diets. Onwudike (1986) reported that increased fiber content of a diet reduces feed efficiency. Similarly, Oyawoye and Nelson (1998) also observed reduced growth rate and efficiency due to poor utilization of nutrient as the fibre level in the diet increased. The best feed to gain ratio obtained on the grits fed diets showed that grits are useful in poultry diets high in fibre. This will help farmers incorporating ingredients with high fibre levels like PKC, BDG wheat offal in their feed formulation. This study also revealed the positive contributions of enzyme in enhancing the nutrient quality of low-energy high fibrous feedstuffs.

Conclusion

Sugarcane Back Scrapping (SBS) is a promising feedstuff that is readily available and it is a waste which is not competed for by man, contrary to other conventional feed ingredients like maize which attracted high price due to competition for its usage. From this study it is obvious that grit inclusion will aid the utilization of SBS and is recommended at 7.5% level. Enzyme has not effectively aided the usage of SBS as birds fed enzyme had not performed well like those on the control. Since SBS is less expensive and readily available, its inclusion together with grit especially 7.5% inclusion level in broiler finisher diets will be of assistance to farmers. Birds reared under the intensive system do not scavenge and have no access to stones or grit, therefore, adding stones to conventional diets will aid ability to digest high fibre content of their regular diets.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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