

GROWTH PERFORMANCE OF BROILER CHICKENS FED DIETS CONTAINING GRADED LEVELS OF BREWER'S DRIED GRAIN

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ABSTRACT

This study investigated the growth performance of broiler chickens fed diets containing graded levels of Brewer's Dried Grain (BDG). One hundred and fifty 2 weeks old Arbor acre breeds of broiler chickens were divided into 5 groups (treatments) of 30 birds. Each group was further divided into 3 replicates of 10 birds in a completely Randomized Design. The 5 groups of birds after 2 weeks of brooding on commercial broiler starter diets were allotted to 5 different formulated diets containing 0 (control), 10, 20, 30 and 40% levels of inclusion of (BDG). The birds were fed the experimental diets for 6 weeks (42) days. Average total feed intake (5120.00, 5343.33, 5366.67, 5386.67, 5400.00) average total weight gain (2283.33, 2143.33, 2076.67, 1546.67, 1303.33), average final live weights (2546.67, 2430.00, 2386.67, 1850.00, 1603.33g) feed conversion ratio (2.25, 2.51, 2.67, 3.49, 4.14) and feed cost per kg gain (₦ 300.23, 288.70, 334.48, 427.13, 491.32) were significantly different ($P < 0.05$) between treatment groups. Growth performance parameters decreased with increasing levels of BDG inclusion. It was concluded that inclusion of BDG should not exceed 30 % in broiler diets for cost effective feeding

Key words: Growth performance, broilers, brewer's dried grains

INTRODUCTION

Brewer's Dried Grain (BDG) is a solid waste from the Brewer's industries. It is available and cheap but difficult to dry to low moisture content for easy storage and use, especially during the wet seasons (Rijal, 2009). Jacque (2015) stressed that agro-industrial by-products such as Brewer's Dried Grain (BDG) are primarily fed to dairy cattle but have some nutritional value for poultry as well. Rijal (2009) stated that with shortage and increasing prices of feed ingredients, continuous efforts are being made to make use of the cheaper and available agro industrial by-products in animal feeds in order to reduce cost without any deleterious effects on their performance. Some problems limiting the use of BDG in poultry rations are high fiber content (Jacque, 2015), nucleic acid toxicity, poor palatability and limitation of sulphur amino acids in the product. Nucleic acid toxicity is said to be solved naturally due to the availability of the enzyme (uricase) in mammals which enables them overcome the problem (McDonald *et al.*, 1998). Palatability is improved by blending it with other feedstuffs and sulphur amino acid limitation is overcome by supplementation with synthetic products. In Nigeria with several brewing industries, BDG is readily available. This study was aimed at determining the effects feeding diets containing graded levels of BDG on growth performance of broilers.

MATERIALS AND METHODS

Experimental Site

The experiment was conducted at the poultry unit of the Livestock Investigation Department (L.I.D) of the National Veterinary Research Institute in Vom, a quiet rocky village in Jos South Local Government Area of Plateau State with an altitude of 1285 meters above sea level and a cool climate between December and January with temperatures as low as 8°C. The wet season extends from late April to middle October (NVRI, 2019).

Experimental Diets, Birds, Design and Management

Five (5) experimental diets were formulated such that Brewer's Dried Grain was included in the diets at 0 (control), 10, 20, 30 and 40 % levels at starter and finisher phases (Table 1) The diets were formulated to contain the same levels of dietary protein. After 2 weeks brooding on commercial broiler starter feeds, the birds were allotted to the five different diets, each having 30 birds. The five groups were further divided into 3 replicates of 10 birds in a Completely Randomized Design. The starter diet was fed to the birds for a period of 2 weeks while the finisher diet was fed for duration of 4 weeks. The parameters taken were the initial and final weights, feed intake, weights gained. Feed Conversion Ratio (FCR) and feed cost per kg weights gained were calculated from the values obtained from the aforementioned parameters.

Table 1: Ingredient Composition of Broiler Finisher Diets

Ingredients	Levels of BDG inclusion in diet (%)				
	0	10	20	30	40
Yellow Maize	49.23	44.21	38.24	34.25	29.25
Wheat offal	7.38	6.64	5.74	5.14	4.39
Rice bran	4.94	4.42	3.82	3.43	2.93
BDG	0.00	10.00	20.00	30.00	40.00
SBC	34.22	30.46	27.64	22.94	19.19
Fish Meal	1.00	1.00	1.00	1.00	1.00
Bone Meal	1.50	1.50	1.50	1.50	1.50
Premix	0.25	0.25	0.25	0.25	0.25
Limestone	1.00	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25	0.25
Methionine	0.15	0.15	0.15	0.15	0.15
Lysine	0.10	0.10	0.10	0.10	1.10
Total	100	100	100	100	100
Calculated Analysis					
Crude Protein (%)	21.00	21.00	21.00	21.00	21.00
ME (Kcal/Kg)	2,920.41	2,803.97	2,682.31	2,581.16	2,468.16
Crude Fibre (%)	3.87	193.48	383.08	572.70	762.31
Ether extract (%)	3.50	193.15	382.75	572.45	762.10
Calcium (%)	0.66	190.65	380.44	570.62	760.61
Phosphorous (%)	0.76	190.71	380.66	570.61	760.56

M.E. = Metabolizable Energy

Water and feed were supplied *ad libitum* with other routine management, practices as outlined by Oluyemi and Roberts (2007). All growth performance data obtained were subjected to Analysis of Variance using SPSS (2017) package. Where applicable differences between the means were separated using the Duncan option in the same package

RESULTS AND DISCUSSIONS

Table 2. Proximate composition of Brewer's Dried Grain

Nutrients	Composition (%)
Moisture	6.19
Crude protein	17.79
Crude fibre	8.25
Lipids	6.41
Ash	5.53
NFE	55.83
Calcium	1.10

Table 3. Performance of broiler chickens fed diets with different levels of B D G

Parameter	Levels of inclusion of Brewer's Dried Grains (%)					SEM
	0	10	20	30	40	
Av. Initial weights (g)	263.33 ^b	286.67 ^{ab}	310.00 ^a	303.33 ^a	300.00 ^a	5.89
Av. Final weights (g)	2,546.67 ^a	2,430.00 ^a	2,386.67 ^a	1,850.00 ^b	1603.33 ^b	113.90
Av. Total weight gains (g)	2,283.33 ^a	2,143.33 ^a	2,076.67 ^a	1,546.67 ^b	1303.33 ^b	116.49
Av, Total feed intake (g)	5,120.00 ^b	5,343.33 ^a	5,366.67 ^a	5,386.67 ^a	5400.00 ^a	36.26
Feed Conversion Ratio	2.25 ^c	2.51 ^c	2.67 ^c	3.49 ^b	4.14 ^a	1983
Feed cost/kg gain (₦)	300.23 ^b	288.70 ^b	334.48 ^b	427.13 ^a	491.32 ^a	22.39

^{a,b,c} Means in the same row with different superscripts are significantly different ($P < 0.05$)

SEM = Standard Error of Mean

Proximate composition of Brewer's Dried Grain (BDG)

The proximate composition of BDG used in this study is presented in table 2. The values obtained for most of the nutrients are similar to 8.50 % Moisture, 17.80 % Crude Fibre, 6.80 % Ether Extract, 50.80 % NFE, 5.53 % Ash and 17.79 % Crude Protein reported by Imonikebe and Kperegbeiyi (2014). However, the result is different from the composition obtained by Isikwenu (2011) who reported that BDG contained 24.21 % Crude protein, 11.20 % Crude fibre, 3.69 % lipids, 8.04 % Ash and 46.20 % NFE. The differences may be due to differences in geographical locations or soil compositions where the various grains were cultivated, the types of varieties or cultivars of crops used, stage of ripeness at which the grains were harvested (Bolton and Blair, 1986) or even differences in accuracy or precision of laboratory techniques used for the analyses. It may also be due to differences in processing methods of the grains in the different locations.

The Effect of Brewers Dried Grain on Feed Intake of Broiler Chickens

Based on the findings of this work presented in table 3, feed intake increased ($P < 0.05$) with increasing levels of BDG inclusion across the treatments. A similar report was given by Swain *et al* (2012), who recorded significant ($P < 0.05$) increases in feed intake as levels of brewer's dried grain incorporated in chick diets increased. However, the results of this work is not in agreement with what was obtained in the study undertaken by Denstadli *et al.* (2010), who reported that inclusion of brewer's dried grain had no effect on feed intake. The difference between this work and that of Denstadli *et al.* (2010) may be due to differences in compositions, methods of processing of BDG and differences in feed forms (mash and pellets respectively) fed to the birds in the different studies respectively. Weight gains decreased significantly ($p < 0.05$) across the treatments. The birds fed diets containing 0 % BDG recorded the highest weight gain, followed by those fed diets containing 10, 20, 30 and 40 % in that order agreeing with reports of Denstadli *et al.* (2010) who stated that increasing levels of BDG reduced the rate of body weight gains of broilers. The feed conversion ratio (FCR)

values for birds in this study were 2.25, 2.51, 2.67, 3.49 and 4.14 respectively which increased ($P < 0.05$) with increasing levels of BDG inclusion in the diets. Calculated Metabolizable Energy values decreased with increasing levels of BDG inclusion which could be why FCR values were increasing across treatments as birds are known to increase feed intake in order to meet their energy requirements (Davidson *et al.*, 1961). The higher FCR values of birds fed diets containing BDG is as a result of the diets containing lower energy and higher fibre contents. Feed cost per kg weight gain of the birds in this study are ₦300.23, ₦288.70, ₦334.48, ₦427.13 and ₦491.36 were significantly different ($P < 0.05$) across treatments with broilers fed diets containing 40 % level of BDG recording the highest cost per unit weight gain. Those fed 10 % BDG diet recorded the least cost per unit weight gain which was not significantly different from those fed 0 and 20 % BDG levels.

CONCLUSION AND RECOMMENDATIONS

Based on the results of this study, the growth rate of broiler chickens is influenced by levels of BDG in their diets. The rate of weight gain decreased with increasing levels of BDG in the diet and vice versa. Also, the higher the level of BDG in the diet, the higher the FCR and feed cost per kg gain values. It is therefore, recommended that broilers diets can contain up to 20 % level of BDG without any adverse effect on growth performance.

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