



## GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKENS FED GRADED LEVELS OF BREWER DRIED GRAIN AS SUBSTITUTE FOR MAIZE

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### ABSTRACT

The study was conducted to evaluate the growth performance and carcass characteristics of broiler chickens fed graded levels of brewers dried grain (BDG) as substitute for maize. A total of two hundred and forty (240) broiler chickens were allotted to four (4) experimental groups in a completely randomized design (CRD) and fed graded levels (0, 10, 20 and 30%) of brewers dried grain (BDG). The experimental groups were designated as treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> respectively and further replicated four (4) times with 15 birds per replicates, each group had a total of sixty (60) birds. Growth parameters determined were initial weight grain, final weight gain, daily feed intake, daily, weight gain and feed conversion ratio. At the end of the feeding trials, two birds per treatment were randomly selected from each of the replicates, starved overnight and slaughtered to evaluate carcass and organs characteristics. Results showed that at the starter phase there were no significant ( $P>0.05$ ) difference on growth performance parameters. The results at the finisher recorded significant ( $P<0.05$ ) difference in average daily feed intake. There was no significant ( $P<0.05$ ) difference in the overall performance among the treatment groups. Significant ( $P<0.05$ ) difference was observed on the carcass parameters measured in plucked weight, carcass, dressing percentage, small intestine, liver, and kidney. However, the values obtained for other carcass parameters did not differ. From these findings, it can be concluded brewers dried grain can replace maize up to 30% in broiler diets without any adverse effect on the performance. Based on the result obtained from this study it was recommended that the use of brewers dried grain at 30% level resulted in lower feed cost thereby improving the profit margin of the poultry production. More studies should be conducted on the inclusion of spent sorghum residue at 50% to evaluate the response on the broiler chickens

**Keywords:** Brewer, Broiler, Carcass, Dried and Garin

### INTRODUCTION

Poultry meat is a rich source of high-quality protein, minerals and vitamins (Adelowo *et al.*, 2019). Poultry production especially broiler chickens' production is an integral part to achieve substantial and rapid production of high-quality protein to meet up the increasing demand of developing countries (Raji *et al.*, 2010). Feed is a major factor determining profitability of livestock production in general and poultry production in particular due to the over dependence on high-cost conventional feedstuff (Adegbenro *et al.*, 2020). Feed alone constitutes about 55-70% cost of poultry production (Umar *et al.*, 2020). This high cost has been attributed to the over-dependence on the expensive conventional feed stuffs particularly protein and energy source such as soybean and groundnut cake which is mainly used in poultry feed formulation. The high demand for these feed ingredients has resulted in an increase in their prices and consequently, cost of poultry feeds and its products, this calls for a serious attention with regard to the quality of chicken meat available (Chisoro, 2015). Thousand tons of brewers' spent grains are turned out annually from many small- and large-scale breweries in the country,



with only a small fraction being used by animals particularly monogastric (Kingsell *et al.*, 1999). Udedibie and Emanalom (1993) and Ayodeji and Fasuyi (2005) have successfully incorporated 20% maize- sorghum beer residue in poultry diets. Uchegbu *et al.* (2010) also reported the use of 30% maize-sorghum beer residue in poultry diets without any deleterious effect on growth and production performance. Therefore, the escalating cost of conventional feedstuff has stimulated research into alternative feedstuffs with the aim of reducing the cost of poultry production, maintaining the feed quality, increasing the production rate and improving the health status of the birds (Saeed *et al.*, 2017). FAO (2012) reported the use of locally available raw materials with potentials as feed ingredients in poultry diets was emphasized. One of the non-conventional feedstuffs focused in this study is spent sorghum residue. Brewers dried grain is relatively cheap as large quantity is produced as local grain production.

## **MATERIALS AND METHODS**

### **Experimental site**

The study was carried out at the poultry unit of Bauchi State Agricultural Development Programme (BSADP) Bauchi, Bauchi State, Nigeria. Bauchi is located between latitude  $9^{\circ} 3'$  and  $12^{\circ} 3'$  north and longitude  $8^{\circ} 50'$  and  $11^{\circ}$  east, occupied a total land area of  $49,11,9\text{km}^2$  representing about 5.3% of Nigeria's total land mass.

Bauchi state is bordered by seven states Kano and Jigawa to the north, Taraba and Plateau to the south, Gombe and Yobe to the east and Kaduna to the west. Bauchi is one of the states in the northern part of Nigeria that span two distinctive vegetation zones, namely, the Sudan Savannah and the Sahel savannah. The Sudan savannah types of vegetation cover the southern part of the state. Here the vegetation gets richer and richer towards the south, especially along water source or rivers, but generally the vegetation is less uniform and grasses, are shorter than what grows further south, that is in the forest zone of the middle belt (Geodatos, 2019).

### **Experimental diets**

Four broiler starter and finisher diets were formulated to contain 0, 10, 20 and 30% brewers dried grain included in the diets. The diets were designated as T1, T2, T3 and T4 respectively. Composition of ingredients in the experimental diets is presented in Table 1.

### **Experimental design and management of birds**

A total of two hundred and forty (240) broiler chickens were randomly allotted to four diets in replicates of four, containing fifteen birds each. Feed and water were served *ad libitum* and the study lasted for 7 weeks. Daily feed intake was measured as the differences between quantities of feed offered and left-over collected the following day. Body weight gain was determined as the difference between two consecutive weighing (1-week interval), while feed conversion ratio was calculated using the relationship of daily feed intake and daily weight gain. Mortality was recorded as it occurred. Two birds per treatment were randomly selected from each replicate of a treatment, starved overnight and slaughtered to evaluate carcass and organs characteristics.

### **Statistical analysis**



All data were subjected to one way analysis of variance (ANOVA) using the SPSS software version 25, and where significant differences were observed, Duncan 's Multiple Range Test was used to separate them.

**Table 1: Ingredients Composition of broiler starter and finisher diets containing graded levels of Brewers dried grain as substitute for maize (%)**

Ingredients	Starter Diets (0-4wks)				Finisher Diets (4-7)			
	0	10	20	30	0	10	20	30
Maize	46.40	41.76	37.12	32.43	59.73	53.7	47.78	41.81
BDG	0.00	4.64	9.28	13.92	0.00	5.97	11.95	17.92
Soybean	35.40	35.40	35.40	35.40	22.07	22.07	22.07	22.07
Wheat offal	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Fish meal	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Bone Meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
<b>Calculated analysis</b>								
ME (Kcal/kg)	2913.00	2855.88	2798.70	2741.63	2952.99	2879.15	2805.87	2732.36
Crude protein	23.00	23.00	23.00	23.00	19.00	19.00	19.00	19.00

## RESULTS AND DISCUSSION

The result for performance (Table 2) revealed that there were no significant ( $P>0.05$ ) differences for the performance (Initial weight, final weight, feed intake, weight gain and feed conversion) among the treatment groups. This result agreed with the finding of Oladiran *et al.* (2020) who reported no significant difference in feed intake, weight gain and feed conversion ratio.

**Table 2: Overall performance of broiler chickens (0-7 weeks) fed graded levels of brewers dried grain substitute for maize**

Parameters	Diets				SEM	LOS
	TI	T2	T3	T4		
Initial weight gain (g)	298.33	305.00	310.00	306.69	9.48	NS
Final weight gain (g)	1897.74	1921.67	1880.26	1915.60	51.56	NS
Total weight gain (g)	1599.41	1616.67	1570.26	1608.98	48.08	NS
Total feed intake (g)	4697.53	4825.00	4645.59	4798.69	112.10	NS
Daily feed intake (g)	95.87	98.47	94.81	97.93	2.29	NS
Daily weight gain (g)	32.64	33.00	33.05	32.84	0.96	NS
Feed conversion ratio	2.94	2.99	2.97	2.99	0.12	NS
Mortality (No)	0	1	3	1	-	-

NS: Not significant ( $p>0.05$ ); LOS: Level of significance

## Carcass analysis of broiler chickens fed brewers dried grain-based diets

The result for carcass characteristic (Table 3) revealed that there was Significant ( $P<0.05$ ) difference in plucked weight, carcass weight, dressing percentage, small intestine, ceaca, liver and kidney. This result was in agreement with the finding of Adama *et al.* (2007)

who reported that higher inclusion of BDG and spent sorghum residue reduced the carcass and dressing percentage. There was no significant ( $P < 0.05$ ) difference in live weight, eviscerated, head, legs, large intestine, pancreas, lungs, hearts, spleen, gizzard and abdominal fat. The result is in agreement with the finding of Kokol *et al.* (2012) who reported that the inclusion of brewers dried grain (BDG) and spent sorghum residues (SSR) up to 20% did not affect the live weight of broiler chickens

**Table 3: Carcass Characteristics of Broiler chickens fed graded levels of brewers dried grain substitute for maize**

Parameters	Diets				SEM	LOS
	T1	T2	T3	T4		
live weight (g)	2200.00	2025.00	2025.00	2057.50	3.27	NS
Pluck weight (g)	2000.00 <sup>a</sup>	1862.50 <sup>ab</sup>	1862.50 <sup>ab</sup>	1712.50 <sup>b</sup>	110.04	*
Eviscerated weight (g)	1675.00	1650.00	1562.52	1525.00	74.13	NS
Carcass weight (g)	1562.50 <sup>a</sup>	1425.00 <sup>ab</sup>	1387.50 <sup>ab</sup>	1375.00 <sup>b</sup>	77.39	*
Dressing (%)	1.84 <sup>a</sup>	70.37 <sup>a</sup>	68.49 <sup>b</sup>	67.50 <sup>b</sup>	1.35	*
<b>Organ weight</b>						
Head	2.34	2.44	2.45	2.53	0.16	NS
Legs	4.32	4.34	4.24	4.28	0.30	NS
Small intestine	7.18 <sup>ab</sup>	7.07 <sup>ab</sup>	8.16 <sup>a</sup>	6.08 <sup>b</sup>	0.61	*
Large intestine	0.36	0.18	0.21	0.20	0.97	NS
Pancreas	0.30	0.27	0.34	0.27	0.43	NS
Liver	2.07 <sup>ab</sup>	2.14 <sup>a</sup>	2.05 <sup>ab</sup>	1.81 <sup>b</sup>	0.14	*
Heart	0.42	0.42	0.51	0.44	0.74	NS
Lung	0.66	0.65	0.64	0.61	0.99	NS
Ceaca	0.81 <sup>ab</sup>	0.71 <sup>ab</sup>	0.87 <sup>a</sup>	0.58 <sup>b</sup>	0.12	*
Kidney	0.50 <sup>a</sup>	0.29 <sup>b</sup>	0.32 <sup>b</sup>	0.25 <sup>b</sup>	0.48	*
Spleen	0.24	0.21	0.16	0.13	0.90	NS
Gizzard	3.44	2.95	3.17	3.25	0.28	NS
Abdominal fat	0.81	0.38	0.47	0.49	0.20	NS

abc: Means on the same row with different superscripts differ significantly ( $p < 0.05$ ) NS: Not significant ( $p > 0.05$ ), SEM: Standard error of means, LOS: Level of significance

## CONCLUSION AND RECOMMENDATIONS

From the result obtained in this study it can be concluded that incorporation of brewers dried grain (BDG) to replace maize at up to 30% levels did not affect growth performance and carcass yield of broiler chickens. Inclusion of BDG in the diets of broiler chickens led to reduction in the feed cost

Based on the result obtained from this study it was recommended that the use of brewers dried grain at 30% level resulted in lower feed cost thereby improving the profit margin of the poultry production. This diet is therefore recommended for broiler chickens. More studies should be conducted on the inclusion of spent sorghum residue at 50% to evaluate the response on the broiler chickens

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