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RESPONSE OF BROILER CHICKENS TO DIETS CONTAINING GRADED LEVELS OF SPENT SORGHUM RESIDUES

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ABSTRACT

This study was conducted to evaluate the response of broiler chickens to diets containing graded levels of spent sorghum residues (SSR). A total of two hundred and forty (240) broiler chickens of the Anak 2000 strain were allotted to four (4) experimental groups in a completely randomized design (CRD) and fed graded levels (0, 10, 20 and 30%) of spent sorghum residue (SSR). The experimental groups were designated as treatments T₁, T₂, T₃ and T₄ respectively and further replicated four (4) times with 15 birds per replicates. Growth parameters determined were initial weight gain, 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. The results of growth performance showed no significant ($P < 0.05$) difference across the dietary treatments. However, Significant ($P < 0.05$) difference was observed in carcass parameters such as plucked weight, liver, carcass and kidney. There were no significant ($P < 0.05$) differences in live weight, weights of eviscerated carcass, head, shank, large intestine, pancreas, lungs, hearts, spleen, gizzard and abdominal fat. Economic analysis showed that the feed cost (₦/kg) progressively decreased with increased levels of spent sorghum residue (SSR) which mean that more money can be saved as the percentage (%) SSR increased.

Keywords: Performance, starter, finisher, broiler, carcass and cost

INTRODUCTION

Poultry production especially broiler chicken 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.*, 2018). 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.

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° 3 and 12° 3 north and longitude 8° 50' and 11° east, occupied a total land area of 49,11,9km² representing about 5.3% of Nigeria's total land mass.

Experimental diets



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Four broiler starter and finisher diets were formulated to contain 0, 10, 20 and 30% spent sorghum residues 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. Financial benefit was computed using feed cost per kg, total feed intake and total weight gain.

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 (Duncan, 1955) was used to separate them.

Starter Diets (0-4wks)				Finisher Diets (4-7)			
Ingredients							
0	10	20	30	0	10	20	30
Maize	46.40	41.76	37.12	32.43	59.73	53.75	47.78
SSR	0.00	4.64	41.81				
Soya bean	35.40	35.40	9.28	13.92	0.00	5.97	11.95
Wheat offal	10.00	10.00	17.92				
Fish meal	4.00	4.00	35.40	35.40	22.07	22.07	22.07
Bone Meal	2.00	2.00	22.07				
Limestone	1.50	1.50	10.00	10.00	10.00	10.00	10.00
Salt	0.25	0.25	10.00				
Premix	0.25	0.25	4.00	4.00	4.00	4.00	4.00
Lysine	0.10	0.10	4.00				
Methionine	0.10	0.10	2.00	2.00	2.00	2.00	2.00
Total	100.00	100.00	2.00				
calculated			1.50	1.50	1.50	1.50	1.50
analysis			1.50				
ME	2913.00	2855.88	0.25	0.25	0.25	0.25	0.25
(Kcal/kg)	23.00	23.00	0.25				
Crude			0.25	0.25	0.25	0.25	0.25
protein			0.25				
			0.10	0.10	0.10	0.10	0.10
			0.10				
			0.100.10	0.10	0.10	0.10	0.10
			100.00	100.00	100.00	100.00	100.00
			100.00				



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Table 2: Overall performance of broiler chickens (0-7 weeks) fed diets containing graded levels of spent

sorghum residues						
Parameters	T1(0)	T2(10)	Diets		SEM	LOS
			T3(20)	T4(30)		
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
		2798.7	2741.63	2952.99	2879.15	2805.87
		2732.36				
		23.00	23.00	23.00	23.00	23.00

RESULT AND DISCUSSION

The results 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 agree with the finding of Oladiran *et al.* (2020) who reported no significant ($P>0.05$) difference in feed intake, weight gain and feed conversion ratio of chickens fed diets containing spent sorghum residue.



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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 (%)	-	2.40	7.20	2.40	-	-

NS: Not significant ($p>0.05$)

SEM: Standard error of means

LOS: Level of significance

Economic of Production of broiler chickens fed graded levels of spent sorghum

Result for the economic analysis (Table 3) revealed that Feed cost (₦/kg) and Feed cost gain (₦/kg gain) progressively decreased with increased levels of spent sorghum residue (SSR) which mean that more money can be saved as the percentage (%) SSR increased

Carcass analysis of broiler chickens fed diets containing graded levels of sorghum spent residue

The result for carcass characteristic (Table 4) 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 were 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: Economic analysis of broiler chickens fed diets containing graded levels of spent sorghum residue

PARAMETERS	Diets			
	T1 (0)	T2(10)	T3(20)	T4(30)
Total feed intake (kg)	4.70	4.83	4.65	4.80
Feed cost (₦/kg)	121.55	119.58	117.63	115.65
Total feed cost (₦)	571.29	577.57	546.98	555.12
Total weight gain (kg)	1.60	1.62	1.57	1.61
Feed cost gain (₦/kg gain)	357.06	356.52	348.39	344.80
Cost saving (₦)	-	0.54	8.67	12.26

**Table 4: Carcass Characteristics of Broiler chickens fed diets containing graded levels of spentsorghum residue**

Parameters	Diets				SEM	LOS
	T1 (0)	T2(10)	T3(20)	T4(30)		
Live weight (g)	2200.00	2025.00	2025.00	2037.50	3.27	NS
Plucked weight (g)	2000.00 ^a	1862.50 ^{ab}	1862.50 ^{ab}	1712.50 ^b	110.04	*
Eviscerated wt. (g)	1675.00	1650.00	1562.52	1525.00	74.13	NS
Carcass weight (g)	1562.50 ^a	1425.00 ^{ab}	1387.50 ^{ab}	1375.00 ^b	77.39	*
Dressing (%)	71.84 ^a	70.37 ^{ab}	68.49 ^b	67.50 ^b	1.35	*
Organs expressed As Percentage dressed Weight						
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 ^{ab}	7.07 ^{ab}	8.16 ^a	6.08 ^b	0.61	*
Large intestine	0.36	0.18	0.21	0.20	0.97	NS
Pancrease	0.30	0.27	0.34	0.27	0.43	NS
Liver	2.07 ^{ab}	2.14 ^a	2.05 ^{ab}	1.81 ^b	0.14	*
Heart	0.42	0.42	0.51	0.44	0.74	NS
Lungs	0.66	0.65	0.64	0.61	0.99	NS
Caeca	0.81 ^{ab}	0.71 ^{ab}	0.87 ^a	0.58 ^b	0.12	*
Kidney	0.50 ^a	0.29 ^b	0.32 ^b	0.25 ^b	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

CONCLUSION

From the result obtained in this study it can concluded that:

Incorporation of spent sorghum residues (SSR) to replace maize at up to 30% levels did not affect growth performance and carcass yield of broiler chickens. Inclusion of SSR in the diets of broiler chickens led to reduction in the feed cost

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