INFLUENCE OF TANNASE SUPPLEMENTATION ON DIFFERENT VARIETIES OF SORGHUM ON GROWTH PERFORMANCE AND APPARENT NUTRIENT DIGESTIBILITY OF BROILER FINISHER CHICKENS.

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ABSTRACT

In a feeding trial to determine the growth performance and nutrient digestibility of finisher broiler chickens (28-56days) fed red sorghum (RS) and white Sorghum (WS) based diet with or without tannase supplementation, a total of 240 unsexed Arbor acre broiler chickens aged 28 days were randomly allotted to eight (8) dietary treatments having 3 replicates each of 10 birds per replicate. The experimental design used was completely randomized in 2 x 4 factorial arrangement. Of the eight diets in which maize (Zea mays) replaces sorghum at 0%, 100% Red Sorghum (RS), 100% White Sorghum (WS) and 50RS:50WS%, diets 1, 2, 3 and 4 were without tannase while diets 5, 6, 7 and 8 were supplemented with tannase. The growth performance data was collected weekly and nutrient digestibility at 56 days old. There was no significant (P>0.05) difference in the growth indices of the finisher birds fed the sorghum-based diet supplemented with tannase except the total feed intake which was highest (P < 0.05) in birds fed 50RS:50WS% diet without tannase. Although, birds fed the control diet with tannase had the least feed intake, those fed the control diet without tannase had the best FCR . None of the nutrient digestibility indices were significantly (P>0.05) influenced except the crude protein retention which was highest (P< 0.05) in birds fed 100%RS diet supplemented with tannase. The experiment concluded that, red and white sorghum with or without tannase may totally replace maize in finisher broilers diet for optimum performance and nutrient digestibility without any deleterious effect.

Keywords: Growth, digestibility, red sorghum, white sorghum, tannase

INTRODUCTION

There is a sudden surge in the prices of poultry products lately in sub-Sahara area especially in Nigeria. This hike in the price could be attributable to the concurrent increase in the prices of ingredients that made up the feed for the chicken (Nwose *et al*., 2022). Feed cost retains about 60-70% of the cost of poultry products production (Thirumalaisamy *et al*., 2016). Maize being about 60-70% component of such feed could therefore be regarded as a major determinant of the cost of poultry product (Fapohunda *et al*., 2008). The demand for maize has however gone above its production in Nigeria sequel to current farmers-herders clashes across the maize growing areas in northern Nigeria. However, the genetical component of broiler chicken must be encouraged to manifest through feeding them with a good metabolizable energy diet throughout their growing period (Stefanello *et al*., 2023). Meeting the energy requirement is of quintessential in all livestock especially broiler chicken (Dozier *et al*., 2007). It therefore became important to source for a readily available and alternative energy-based feedstuff to replace the gallopingly produced maize in the feeding of livestock (Fasuyi, 2010). The incorporation of Sorghum in livestock feed has been documented (Sedghi *et al*., 2011). A main constraint in its large usage is its high content of tannin and phytates (Kwari *et al*., 2012), which are anti-nutritional factor that needed to be biologically and chemically treated (Mafimidiwo *et al*., 2023) or enzymatically fortified (Fasuyi and Okeke, 2014) for ease of digestion by most tolerable livestock such as the broilers. Many enzymes have been isolated in nature for tannin degradation and amongst these is tannase. Tannase helps in the breaking down of the tannin component of the sorghum through catalyzing the hydrolysis of tannin to release glucose and gallic acid content (Selwal *et al*., 2011). Tannase is readily available and easy to handle by all and sundry without any hazardous implication.

Therefore, this experiment was conducted to examine the implication of incorporating red sorghum and the white variety with or without tannase in the diet of broiler finisher.

MATERIALS AND METHODS

Preparation of test ingredients and diets: The red and white sorghum grains were gotten from a reliable toll miller and were crushed using the mechanical crusher, before using it for formulation of the diets. Tannase enzymes were produced at the Federal University of Agriculture, Abeokuta where the experiment was carried out. Sorghum was dehulled to obtain sorghum bran. The medium was prepared and autoclaved. Mouldy bran was broken and dried at 40-50°C and the dried mouldy bran was then crushed, milled and stored (solid tannase) for usage. Eight experimental broiler finisher diets were formulated (table 1) to replace maize with sorghum at 0% (Diet 1), 100%RS (Diet 2), 100%WS (Diet 3) and 50RS:50WS % levels (Diet 4). Diets 1,2,3 and 4 were without tannase, while diets 5,6,7 and 8 had the same composition as diets 1,2,3 and 4 but supplemented with tannase at 0.5 g/kg feed. Formulated diets and cool clean water were offered to the birds *ad-libitum* for 28 days.

Table 1: Gross composition of experimental broiler finisher diets (g/KgDM)

	Without Tannase				With Tannase			
Ingredients	**Diet 1**	**Diet 2**	**Diet 3**	**Diet 4**	**Diet 5**	**Diet 6**	**Diet 7**	**Diet 8**
Maize	57.00	-	-	-	57.00	-	-	-
Red Sorghum	-	57.00	-	28.50	-	57.00	-	28.50
White Sorghum	-	-	57.00	28.50	-	-	57.00	28.50
Fish meal	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Soyabean	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Palm oil	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Wheat offal	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40
Limestone	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Bonemeal	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Lysine	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Methionine	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Broiler Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Common Salt	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Toxin binder	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Tannase	-	-	-	-	+	+	+	+
TOTAL	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
ME (kcal/kg)	2936.50	2873.81	2816.80	2845.31	2936.50	2873.81	2816.80	2845.31
Crude Protein (%)	21.64	22.21	21.81	22.01	21.64	22.21	21.81	22.01
Crude Fat (%)	3.65	2.97	3.08	3.03	3.65	2.97	3.08	3.03
Crude Fibre (%)	3.24	3.13	3.21	3.19	3.24	3.13	3.21	3.19
Calcium (%)	1.16	1.15	1.18	1.17	1.16	1.15	1.18	1.17
Av.Phosphorus (%)	0.44	0.39	0.57	0.48	0.44	0.39	0.57	0.48

Experimental Design: Two hundred and forty unsexed Arbor acre broiler chickens aged 28 days were allotted into 8 dietary treatments of 30 birds per treatment sub-divided into 3 replicates of 10 birds each. The experimental design used was 2x4 factorial arrangement.

Data Collection: Growth performance indices were recorded on weekly basis from the beginning till the end of experiment to determine their weekly body weights and weight gain. Daily feed intake was deduced by deducting the leftover feed from the initial feed supplied and feed conversion ratio was calculated. At the 28th day of the experiment, two birds per replicate were randomly selected for digestibility trial after a three-day acclimatization period.

Statistical Analysis: Data generated were subjected to Analysis of Variance in a 2x4 factorial design using Minitab Statistical package (Minitab, 2017) and significant ($P<0.05$) difference among treatment means were separated by Tukey's procedure of the same package at 99.95% confidence limit.

RESULTS AND DISCUSSION

There was no significant ($P > 0.05$) effect of sorghum-based diet without tannase supplementation on the final weight and weight gain of the chickens, except an improved ($P < 0.05$) feed intake recorded for birds fed diet 4 (50RS:50WS without tannase) and poor FCR (2.20). Several reports have shown that there was no difference in the growth performance of finisher broilers fed sorghum-based diets (Garcia *et al*., 2005). The improved feed intake may be adduced to the slightly lower energy value of sorghum compared to maize, thus making the birds to consume more feed to compensate for the

energy difference (Abdulkadir *et al*., 2016). There was no significant (P > 0.05) difference in all the nutrient digestibility indices (Table 3). Broiler chickens can perform optimally on sorghum-based diet with or without tannase (Torres *et al*., 2013).

Table 2: Influence of tannase supplementation of sorghum on growth performance of broilers.

Replacement level (%)	Tannase supplementation	Average Initial Weight g/bird	Average Final Weight g/bird	Average Weight Gain g/bird	Average Feed Intake g/bird	FCR
0S	+Tannase	499.40	1896.30	1396.90	2649.00	1.88^{bc}
100RS	+Tannase	499.40	2015.60	1516.30	3042.00	2.02^{ab}
100WS	+Tannase	499.40	1853.90	1354.50	2800.00	2.05^{abc}
50RS:50WS	+Tannase	499.40	1973.20	1473.80	2886.00	1.95^{abc}
0S	No Tannase	499.40	2128.10	1628.80	2773.00	1.71^{c}
100RS	No Tannase	499.40	1996.90	1497.87	2869.00	1.94^{abc}
100WS	No Tannase	499.40	2002.80	1503.50	2732.00	1.81^{bc}
50RS:50WS	No Tannase	499.40	1951.90	1452.50	3154.00	2.20^{a}
Pooled SEM		0.00	64.15	64.15	133.62	0.07
0S	-	499.40	2012.20	1512.80	2711.00^{a}	1.80^{b}
100RS	-	499.40	2006.30	1506.90	2955.00^{a}	1.98^{ab}
100WS	-	499.40	1928.40	1429.00	2765.90^{a}	1.93^{ab}
50RS:50WS	-	499.40	1962.50	1463.10	3020.10^{a}	2.07^{a}
SEM Level		0.00	46.50	46.50	96.67	0.17
-	+Tannase	499.40	1934.70	1435.40	2844.10	1.98
-	No Tannase	499.40	2019.90	1520.60	2882..00	1.91
SEM Tannase		0.00	29.50	29.50	61.40	0.03

^{abc}: Means in the same column with different superscript are significantly different (P < 0.05)

Table 3 : Influence of tannase supplementation of sorghum on nutrient digestibility of finisher broilers.

Replacement level (%)	Tannase supplementation	Dry matter(%)	Ash (%)	Crude Protein(%)	Ether extract(%)	Crude fibre (%)
0S	+Tannase	80.14	67.82	72.38	80.88	76.71
100RS	+Tannase	81.78	69.24	75.22	80.52	76.56
100WS	+Tannase	82.18	65.53	75.10	80.14	75.15
50RS:50WS	+Tannase	81.88	70.33	75.12	80.36	75.47
0S	No Tannase	81.52	69.24	74.80	80.14	76.66
100RS	No Tannase	79.89	65.53	72.20	81.01	75.48
100WS	No Tannase	79.90	66.38	72.00	81.69	76.42
50RS:50WS	No Tannase	81.10	66.98	74.12	80.42	75.96
Pooled SEM		1.39	2.99	0.95	3.62	1.97
0S	-	80.83	66.69	73.59	80.51	76.68
100RS	-	80.84	67.39	73.71	80.77	76.02
100WS	-	81.04	65.95	75.55	80.91	75.78
50RS:50WS	-	81.49	68.66	74.62	80.39	75.72
SEM Level		0.98	2.12	0.67	2.56	1.39
-	+Tannase	81.50	68.23	74.45	80.48	75.97
-	No Tannase	80.60	66.11	73.28	80.82	76.13
SEM Tannase		0.70	1.50	0.48	1.81	0.98

S - Sorghum, RS - Red sorghum, WS - White sorghum, FCR - Feed conversion ratio

CONCLUSION AND RECOMMENDATION

Red or white sorghum supplemented with tannase can totally replace maize in the diet of finisher broiler chickens for optimum growth and nutrient digestibility. However, tannase supplementation may not be necessary in sorghum based broiler finisher diet.

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