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Effect of Partial Replacement of Agro-industrial By-products for Maize on Growth Performance, Carcass Characteristics, Blood Profile and Economy of Production in Local Turkey

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Abstract
This study aimed to evaluate the effect of incorporating three agro-industrial by-products as partial substitutes for maize on growth performance, carcass characteristics, blood profile, and economic efficiency in local Turkey. The study, which spanned a duration of fifty-six (56) days, was executed in a completely randomized design (CRD). A total of forty-eight (48) day-old local turkey poults were employed, and they were randomly assigned to four (4) dietary treatments of 12 poults per treatment, and replicated 3 times with 4 poults per replicate. The experimental diets, which contained three agro-industrial by-products, namely maize offal (MO), rice milling residue (RMR), and brewers' dried grain (BDG), were formulated with an inclusion level of 30% each of agro in by-products in the diets. At the starter phase, there were significant differences (P<0.05) in the final weight gain, and average daily weight gain (ADWG), with higher values for final weight, average daily weight gain, and lower feed conversion ratio being recorded as 664.83, 14.57, 14.56, and 3.37g/bird respectively, at T3. The final weight, average daily weight gain (ADWG), and feed conversion ratio (FCR) at the grower phase were not significantly different (P>0.05). However, T4 diet (30% BDG) had the highest final weight, but the lowest feed conversion ratio (FCR) of 1.42 was recorded at T1 (30% MO. The live weight, dress weight, carcass weight, dress percentage, breast, thigh, wings, back, neck, drumstick, liver, heart, and gizzard were not significantly different (P>0.05) among treatment groups, except kidney, which was significantly different (p<0.05) among the treatment groups. The haematological parameters measured, including packed cell volume (PCV), red blood cell (RBC), mean corpuscular haemoglobin (MCH), mean corpuscular volume (MCV), and white blood cell (WBC), were all significantly (P<0.05) different. However, haemoglobin (Hb) and mean corpuscular haemoglobin concentrations (MCHC) were not significantly different (P>0.05). The feed cost decreased as 30% level of each of the three agro-

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industrial by-products replaced maize in this study. Feed cost (N/Kg gain) followed the same trend. The findings revealed that T4 (30% BDG) was more economical for feeding turkey than the control diet (T1) containing 100% of maize and the other treatments. Therefore, it can be concluded that the replacement of maize with up to 30% BDG will offer improved growth performance, pose no health risk to turkeys, and reduce the cost of production.

Keywords: Agro-industrial by-products, Maize offal, Rice milling residue, Brewers' dried grain, Turkey

INTRODUCTION

Turkey, scientifically known as *Meleagris gallopavo*, constitutes an essential component of poultry and represents a crucial bird typically reared for its economic benefits (Adene and Oguntade, 2006). In Nigeria, the turkey population has burgeoned from 1.5 to 2.0 million (Morgan, 1991), thereby emphasizing the increasing significance of turkey production in the country's poultry farming. Feeding in poultry farming accounts for approximately 65 – 80% of the production cost, with the poultry industry being the most affected livestock industry due to problems emanating from insufficient feed supply (Lepaideur, 2004). The major obstacles to efficient poultry production in Nigeria are energy and protein feedstuff which constitute approximately 80% of poultry feedstuff (Uchegbu *et al*., 2004).

The tropical region relies mainly on cereal grains as the primary energy source in poultry feed, while maize constitutes about 50% of the energy in compounded diet, serving as the greatest contributor (Ajaja *et al*., 2002). In Nigeria, there has been a surge in pressure on maize and cassava, with emphasis being placed on exportation since corn is massively exploited in ethanol production as an alternative fuel source (Doki, 2007). Consequently, the cost of maize has skyrocketed, necessitating exploration of cheaper alternative energy sources for poultry feeds. One of the substitutes is agro-industrial by-products. Kwari *et al*. (2004) discovered that non-conventional feed ingredients, such as agricultural by-products or industrial by-products like sorghum chaff, wheat offal, maize offal, rice milling residue, and brewers dried grain, can be utilized in poultry feeding, thereby reducing the cost of production and poultry products. The competition for conventional feed ingredients between man and livestock has significantly contributed to the high cost of conventional feeds in the local market, accounting for 70 – 80% of the cost of monogastric animal production (Makinde and Inuwa (2015).

In the past, agriculturists regarded crop residues as waste and disposed of them into the surrounding environment, leading to severe pollution. However, realizing the importance of these residues, the invulnerable costs of animal feed, fertilizers, and environmental challenges, agriculturists have changed strategies and begun industrializing these residues as useful by-products for animal feed (Ezieshi *et al*., 2011). By-products from cereal grains, cotton, sugarcane, groundnut, soybean, and palm oil production are currently potentially useful as animal feeds.

The aforementioned trend has necessitated the utilization of agro-industrial by-products, such as wheat offal, maize offal, rice offal, palm kernel meal, and brewers dried grains, when formulating feed for livestock. Maize offal, a by-product of maize milling processes, is the second most preferred and conventionally utilized livestock feed in Nigeria, following wheat offal (Babatunde and Oluyemi, 2002). Comprising approximately 110-120 g/kg crude protein and 80-90 g/kg crude fiber, maize offal's proximate composition reveals its key nutritional components (Onifade and Babatunde, 1998). According to Ezieshi *et al*. (2011), maize offal contains 91.92% dry matter (DM), 12.80% crude protein (CP), 12.07% crude fibre (CF), 11.72%

ether extract (EE), 5.42% ash, 49.91% nitrogen free extract (NFE), and 2225 kcal/kg metabolizable energy. The proximate composition of brewer's dried grain (BDG), which is maize/sorghum-based, includes 28.25% CP, 13.12% CF, 6.70% EE, 7.36% total Ash, and 4.23 Kcal/gram of gross energy, according to Uchegbu and Udedibie (1998). However, the nutrient composition of BDG differs depending on the grain source and brewing method (Oluokun and Olalokun, 1995). In many towns in Nigeria's rice-growing regions, rice offal is readily available throughout the year and is high in lysine and methionine content (Makinde *et al*., 2014). Therefore, this study aimed to assess the impact of feeding three agro-industrial by-products (maize offal, rice milling residue, and brewer's dried grain) as a substitute for maize on local turkey's growth performance, carcass characteristics, blood profile, and production economics.

METHODOLOGY

Study Area

The experiment was conducted at the Poultry unit of the Teaching and Research Farm of Taraba State University, Jalingo located between latitude 6^o 30' and 9^o 30' N and longitude 9^o 00' and 12^o 00' E in Guinea Savannah Zone of Northern Nigeria (Kefas *et al*., 2020). It has an annual rainfall range of 1000-1500mm, the ambient temperature of the area range between 30 – 38 ^{o}C with an average of 29 ^{o}C.

Preparation and Processing of Agro-industrial By-products

Three agro-industrial by-products (maize offal, rice milling residues and brewers dried grain) used for this study were sourced from Jalingo and its environments in Taraba State, North Eastern Nigeria. The agro-industrial by-products were air dried for a period of 3 days until they were properly dried. Air drying was done to reduce or eliminate the potential labile toxic factors present in the agro industrial by-products, while retaining most nutrients.

Experimental Birds and Management

The study was conducted using a total of forty-eight (48) unsexed day-old local turkey poults. They were obtained from a reputable farm in Ibadan, Oyo State, Nigeria. The birds were managed on a deep litter system throughout the period of the experiment. Brooding of the poults was done for the first 4 weeks of the experiment, during which they were fed commercial broiler starter feed. Subsequently, formulated dietary treatments and clean drinking water was offered *ad libitum*. All the necessary routine and occasional management, vaccinations and other precautions and sanitary measures were also taken throughout the study period as recommended by (Oluyemi and Roberts, 2000).

Experimental Design

The experimental period which lasted for fifty-six (56) days was designed in a completely randomized design (CRD). After four weeks of brooding, the poults were weighed and randomly divided into four dietary treatments and three replications per treatment thus having four (4) poults per replicate and (12) poults per treatment or pen. Each of the treatment groups was assigned to formulated diets of agro industrial by-products at maize replacement levels of 0, 30, 30 and 30% representing T_1, T_2, T_3, and T_4, respectively for both starter and grower diets. The experimental diets are shown in Tables 1 and 2.

Feeding Trial

The study was carried out to determine the effects of feeding maize offal, rice milling residue and BDG as replacement for maize in local turkey. The turkeys were observed daily, and a record of mortality was kept. Body weight gain and feed intake were determined on weekly basis and feed-to-gain ratio was computed, accordingly. Brooding lasted for the first 4 weeks and the poults were fed commercial diet during the brooding period. The starter phase also lasted for another 4 weeks after the brooding, while the grower phase commenced immediately after the starter phase which also lasted for 4 weeks.

Proximate Analysis
Samples of maize offal, rice milling residues and brewers dried grains were analysed for proximate composition to determine the content of crude protein (CP), crude fibre (CF) fat or ether extract (EE), ash and nitrogen free extract (NFE) using the procedure of AOAC (2001).

Statistical Analysis
The data collected during the experimental period was subject to one-way analysis of variance (ANOVA) according to Steel and Torrie, (1980) using SPSS version 20. Where Significant difference existed, means were separated using Duncan multiple range test (Duncan, 1955).

Table 1: Composition of Turkey Starter Diet from 4 – 8 weeks

Ingredients	T1 Control (0%)	T2 MO (30%)	T3 RMR (30%)	T4 BDG (30%)
Maize	33.15	23.21	23.21	23.21
MO	0.00	9.94	0.00	0.00
RMR	0.00	0.00	9.94	0.00
DBG	0.00	0.00	0.00	9.94
GNC	42.30	42.30	42.30	42.30
FM	14.00	14.00	14.00	14.00
Premix	0.40	0.40	0.40	0.40
Bone meal	7.50	7.50	7.50	7.50
Salt	0.25	0.25	0.25	0.25
Palm oil	2.00	2.00	2.00	2.00
Methionine	0.30	0.30	0.30	0.30
Lysine	0.10	0.10	0.10	0.10
Total	**100**	**100**	**100**	**100**
Calculated Analysis				
ME(Kcal/kg)	2526.77	2238.12	2316.65	2435.43
CP	30.87	30.22	30.59	31.76
CF	1.97	5.18	2.02	1.16
EE	9.02	7.87	9.52	8.20
Calcium	0.51	0.52	0.53	0.54
Methionine	0.07	0.56	0.55	0.6
Lysine	1.45	1.42	1.65	1.68

Vitamin $B_{1,}$ 1000mg; $B_{2,}$ 2000mg; Vitamin $B_{6,}$ 1500mg; Niacin, 1200mg; Pantothenicacid, 2000mg; Biotin, 1000mg; Vitamin B_{12}, 3000mg; Folicacid, 1500mg; ChlorineChloride, 60, 000mg; Manganese, 10, 000mg; Iron, 1500mg Zinc, 800mg; Copper, 400mg; Iodine, 80mg; Cobalt, 40mg; Selenium, 8000mg.. **MO =** Maize offal, **RMR =** Rice Milling Residue, **BDG =** Brewers Dried Grain, **GNC**=Groundnut cake, **FM**=Fishmeal

Table 2: Composition of Turkey Grower Diet 8 – 12 weeks

Ingredients	T1 Control (0%)	T2 MO (30%)	T3 RMR (30%)	T4 BDG (30%)
Maize	53.20	37.24	37.24	37.24
MO	0.00	15.96	0.00	0.00
RMR	0.00	0.00	15.96	0.00
DBG	0.00	0.00	0.00	15.96
GNC	27.75	27.75	27.75	27.75
FM	10.00	10.00	10.00	10.00
Premix	0.40	0.40	0.40	0.40
Bone meal	6.00	6.00	6.00	6.00
Salt	0.25	0.25	0.25	0.25
Palm oil	2.00	2.00	2.00	2.00
Methionine	0.30	0.30	0.30	0.30
Lysine	0.10	0.10	0.10	0.10
Total	**100**	**100**	**100**	**100**
Calculated Analysis				
ME(Kcal/kg)	2760.60	2297.13	2423.21	2613.90
CP	23.56	22.51	23.1	24.99
CF	2.33	7.45	2.41	3.75
EE	6.92	10.15	8.31	10.96
Calcium	0.37	0.39	0.39	0.41
Methionine	0.44	0.41	0.50	0.51
Lysine	1.07	1.00	1.07	1.45

Vitamin $B_{1,}$ 1000mg; $B_{2,}$ 2000mg; Vitamin $B_{6,}$ 1500mg; Niacin, 1200mg; Pantothenicacid, 2000mg; Biotin, 1000mg; Vitamin B_{12}, 3000mg; Folicacid, 1500mg; ChlorineChloride, 60, 000mg; Manganese, 10, 000mg; Iron, 1500mg Zinc, 800mg; Copper, 400mg; Iodine, 80mg; Cobalt, 40mg; Selenium, 8000mg.. **MO =** Maize offal, **RMR =** Rice Milling Residue, **BDG =** Brewers Dried Grain, **GNC**=Groundnut cake, **FM**=Fishmeal

RESULTS AND DISCUSSION

The findings of the proximate composition analysis on agro-industrial by-products, namely maize offal, rice milling residue, and brewer's dried grain, have been presented in Table 3. The findings suggest that maize offal is composed of 88% dry matter (DM), 11.40% crude protein (CP), 13.70% crude fiber (CF), 7.50% ash, 11.00% fat (EE), and 44.0% nitrogen-free extract (NFE). Similarly, rice milling residues contain 90% DM, 6.60% CP, 11.30% CF, 17.50% ash, 1.00% fat (EE), and 45.60% NFE. Additionally, BDG had 89.50% DM, 32.20% CP, 8.20% CF, 10.0% ash, 11.00% fat (EE), and 36.10% NFE. It is noteworthy that the concentrations of nutrients in agro-industrial by-products may differ depending on the source, processing technique, soil type, and climatic conditions of the production region (Makinde and Inuwa (2015).

The findings regarding the impacts of feeding agro-industrial by-products on the growth performance of turkeys are presented in Table 4. During the starter phase, there were no significant (P>0.05) in terms of average daily gain, average daily feed intake and feed efficiency between the control group and those fed with agro-industrial by-products. However, there was a significant (P<0.05) effect of the agro-industrial by-products diets observed on the final body weight of the turkey at the starter phase. Specifically, turkeys fed with T2 (30% Maize offal) exhibited significantly (P<0.05) higher final body weight when compared to the control group and other treatments. In the growers' phase, the final weight, average daily gain, and feed efficiency were not significantly (P<0.05) affected by the treatment diets. Numerically, the lowest feed conversion ratio (FCR) of 1.42 was recorded for the control diet (T1 0%) when compared to other treatments. Turkeys fed with T4 (30% BDG) had the highest final body weight and significantly (P<0.05) higher average feed intake compared to the control group and other treatments. The results for live weight, dress weight, carcass weight, dress percentage, breast, thigh, wings, back, neck, drumstick, liver, heart, and gizzard as a percentage of live weight are shown in Table 5. There was a significant difference

(P<0.05) between treatment means for the kidney. The values for kidney were significantly (P<0.05) higher for T4 (30% BDG) and T3 (30% RMR). However, the other carcass parameters were not significantly (P>0.05) affected by the treatment diets. The results for the haematological and serum biochemical parameters are presented in Table 6. There was a significant difference (P<0.05) for haematological parameters across all the treatment means, except for hemoglobin (Hb) and mean corpuscular hemoglobin (MCHC) which were not significantly different (P>0.05). The value for PCV was significantly (P<0.05) higher for T2 (30% MO) and T3 (30% RMR). Similarly, the significantly highest values for RBC (4.25 x $10^{12/L}$) and (4.05 x $10^{12/L}$) were also recorded in T2 (30% MO) and T3 (30% RMR), respectively. The turkeys fed diet T4 (30% BDG) and T1 (control) had significantly (P<0.05) higher values for MCH as 27.93 x$10^{9/dl}$ and 27.67 x$10^{9/dl}$ respectively. All serum biochemical parameters were not significantly (P<0.05) affected by the treatment diets. The parameters for the economy of production are presented in Table 7. The results of the study showed that feed cost decreases as 30% of each of the three agro-industrial by-products used replaced maize, in terms of economy of production. Feed cost (N/Kg gain) followed the same trend. The 30% BDG had the lowest feed cost (N/Kg). The turkeys fed T4 diet had the lowest feed cost of 323.08 (N/kg), while the lowest feed cost of 2739.80 (N/Kg gain) was recorded in T2.

From the findings of this study, it was observed that the final body weight of turkeys fed with diet T4 (30% BDG) was significantly (P<0.05) higher compared to both the control-based diet and other treatments. This could be attributed to the higher CP value of the BDG as observed from the proximate composition in Table 3. A similar outcome was reported in a study where 25% of BDG was fed to turkeys during the grower phase (Uchegbu and Udedibie, 1998). The improvement can be accounted for as a result of the high availability of digestible and easily absorbable protein contained in BDG, as well as better fatty acids and mineral compositions, including a reasonable content of B complex vitamins (Uchegbu and Udedibie, 1998; Esonu, 2000). Unlike the report by Ojeola (1992), who observed depression in growth performance when 20% of high fiber diet containing rice milling residue and maize offal were fed to local turkeys, the present study did not show any depression in growth performance of local turkeys fed 30% MO, 30% RMR, and 30% BDG. Interestingly, the growth performance on the 30% MO, 30% RMR, and 30% BDG was found to be comparable to the control diet in this current study. Furthermore, this present study did not agree with the report of Makinde and Inuwa (2015) who observed that 15% MO and 15% Rice offal (RO) as a replacement for maize caused a reduction in the body weight of grower turkeys due to depressed feed intake. Rather, the intake in the current study was greatly improved with the incorporation of the 30% MO, 30% RMR, and 30% BDG. The difference witnessed in this study can be traced to the improvement in the processing of the Agro-industrial by-products used.

The range of values obtained for the final live weight (1386.67 – 1637.00 g) in this study was higher than that reported by Ironkwe *et al.* (2015), which was between (1100.00 – 1163 g). In this study, the treatment diet did not affect the carcass and internal organ weight, which is in contrast to the report by Makinde and Inuwa (2015), who observed a decreasing trend in the carcass and internal characteristics of grower turkeys when fed 15% MO and 15% RO. The results of the blood profile analysis in this study revealed that the PCV values were similar to those reported by Makinde and Inuwa (2015) and fell within the normal range (35-39%), as reported by Daniel-Igwe and Okwara (2017). This finding suggests that the supplementation with the agro-industrial by-products was beneficial in maintaining the protein status of the birds at different physiological states. The white blood cell (WBC) recorded a reduction with the supplementation of the agro-industrial by-products, contrary to the report by Makinde and Inuwa (2015), who reported a significant increase compared to the maize-based diet (control). The implication of this result is that the 30% inclusion of these agro-industrial by-products in turkey diets will reduce health hazards and improve the immunity of the turkeys to fight diseases.

Table 3: Proximate Composition of Maize offal, Rice Milling residue and Brewers Dried Grain

	Moisture %	Fat %	Ash %	Fibre %	Crude Protein %	NFE %	DM %
BDG	10.5	11.0	10	8.2	32.2	36.1	89.5
RMR	10.0	1	17.5	11.3	6.6	45.6	90
MO	12	11	7.5	13.7	11.4	44	88

BDG = Brewers Dried Grain, RMR = Rice Milling Residue, MO = Maize offal, NFE = Nitrogen Free Extract, DM = Dry Matter

Table 4: Growth Performance of Turkey Feed Three Agro-Industrial By-Products

Parameters	T1 0% Control	T2 (30%) MO	T3 (30%) RMR	T4 (30%) BDG	SEM	LOS
			Starter (4-8Wks)			
Initial Weight	241.66	266.50	275.50	263.42	7.52	NS
Final Weight	515.08^{b}	654.41^{a}	664.83^{a}	597.75^{ab}	18.30	*
Total Feed Intake	5044.67	5125.00	5406.33	6191.67	207.7	NS
Weight Gain	259.00^{b}	387.91^{a}	389.33^{a}	334.33^{ab}	15.60	*
Average Daily Feed Intake (g)	45.04	45.76	48.26	55.24	1.85	NS
Average Daily Weigh Gain (g)	9.25	13.85	14.57	11.93	0.61	*
Feed Conversion Ratio	4.93	3.38	3.37	4.69	0.28	NS
			Grower (8-12Wks)			
Initial Weight	515.08^{b}	654.41^{a}	664.83^{a}	597.75^{ab}	18.30	*
Final Weight	1398.67	1497.67	1605.00	1637.00	81.95	NS
Total Feed Intake	6244.67^{b}	7050.00^{a}	6889.33^{ab}	7547.00^{a}	122.83	*
Weight Gain	869.91	843.25	940.16	1039.25	69.87	NS
Average Daily Feed Intake (g)	55.75^{b}	62.94^{a}	61.50^{ab}	67.38^{a}	1.96	*
Average Daily Weigh Gain (g)	31.06	30.11	33.57	37.11	2.49	NS
Feed Conversion Ratio	1.42	2.06	1.83	1.97	0.14	NS

a,b = means within the same row bearing different superscripts differ significantly (P<0.05), SEM = Standard Error of Means, M.O= Maize offal, RMR = Rice Milling Residue and BDG = Brewers Dried Grain, T_1, T_2, T_3 and T_4 representing diets containing 0%, and 30% inclusion level of agro -industrial by product.

Table 5: Carcass Yield and Internal Organ Characteristics of Turkey Fed Three Agro Industrial By-Products

Parameters	T1 0% Control	T2 (30%) MO	T3 (30%) RMR	T4 (30%) BDG	SEM	LOS
Live wt	1386.67	1497.50	1605.00	1637.00	81.43	NS
Dress wt	1177.67	1319.50	5396.33	1293.33	1167.63	NS
Carcass wt	899.00	1015.50	1037.00	1000.00	72.53	NS
Dress %	64.79	67.44	64.59	59.77	1.64	NS
Breast (g)	232.67	243.33	251.00	252.00	19.98	NS
Thigh (g)	130.67	145.00	139.50	139.33	9.62	NS
Wings (g)	182.67	157.50	171.50	168.67	10.51	NS
Back (g)	182.67	221.00	210.50	203.33	14.34	NS
Neck (g)	70.67	84.00	88.00	80.00	6.86	NS
Drumstick (g)	128.00	138.00	144.50	135.33	9.66	NS
Internal organs (g)						
Kidney (g)	1.33^{b}	1.00^{b}	5.00^{a}	5.67^{a}	0.43	*
Liver (g)	25.67	26.50	28.50	28.67	1.41	NS
Heart (g)	4.67	7.50	5.50	6.00	0.59	NS
Gizzard (g)	43.33	48.50	55.00	39.67	2.29	NS

a,b = means within the same row bearing different superscripts differ significantly (P<0.05), SEM = Standard Error of Means, MO= Maize offal, RMR = Rice Milling Residue and BDG = Brewers Dried Grain, T_1, T_2, T_3 and T_4 representing diets containing 0%, and 30% inclusion level of agro -industrial by product.

Table 6: Haematological and Serum Biochemical Parameters of Turkey Fed Agro Industrial By-Products

Haematological parameter	T1 0% Control	T2 (30%) MO	T3 (30%) RMR	T4 (30%) BDG	SEM	LOS
PCV (%)	30.33^{b}	36.33^{a}	35.00^{a}	34.33^{ab}	0.76	*
Hb (g/dI)	9.40	10.38	10.55	10.77	9.93	NS
RBC $(x10)^{12}$/L)	3.40^{a}	4.25^{a}	4.05^{a}	3.87^{ab}	0.28	*
WBC($X10^{9}$/dl)	4.00^{a}	2.55^{c}	3.65^{ab}	3.17^{bc}	3.17	*
MCHC (g/L)	31.00	30.55	30.15	31.40	7.31	NS
MCH ($x10^{9}$/dl)	27.67^{ab}	$26.25b^{c}$	26.05c	27.93^{a}	8.08	*
MCV (dl)	88.90^{a}	85.90^{b}	86.45^{ab}	88.93^{a}	0.45	*
Total protein (%)	30.93	20.55	20.40	25.67	1.66	NS
Albumin (g/dl)	13.50	14.30	15.65	19.83	0.88	NS
Globulin (g/dl)	17.43	6.25	12.13	5.83	2.26	NS
Urea (mmol/I)	1.87	3.15	2.35	2.50	8.24	NS
Creatinine (umol/l)	36.97	62.30	44.55	49.47	5.12	NS
Glucose (mmol/l)	11.77	12.40	12.85	11.37	10.23	NS

a,b = means within the same row bearing different superscripts differ significantly (P<0.05), SEM = Standard Error of Means, MO= Maize offal, RMR = Rice Milling Residue and BDG = Brewers Dried Grain, T_1, T_2, T_3 and T_4 representing diets containing 0%, and 30% inclusion level of agro -industrial by product. NS = Not Significant, * = Significant at P<0.05

Table 7: Economic Analysis of Production of Turkey Agro-Industrial by products as a Replacement of Maize

	Treatments			
Parameters	**T1 (0%)**	**T2 (30% MO)**	**T3 (30% RMR)**	**T4 (30% BDG)**
Total Feed intake (Kg/bird)	6.23	7.05	6.89	7.55
Feed Cost (N/Kg)	359.34	326.45	324.38	323.08
Cost of Total Feed intake (N/Kg)	2238.69	2301.47	2234.98	2439.25
Total Weight Gain (Kg)	0.87	0.84	0.94	1.04
Feed Cost (N/Kg gain)	2573.20	2739.80	2377.60	2345.45

CONCLUSION

Based on the findings derived from this investigation, it can be ascertained that BDG stands as the preeminent agro-industrial by-product capable of substituting maize up to 30% without compromising the growth performance and health status of indigenous turkeys. Additionally, the 30% substitution of maize with BDG was appraised to possess the lowest feed expense and hence more financially viable to implement in the production of indigenous turkeys in comparison to a complete maize-based diet.

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