PERFORMANCE AND COST IMPLICATION OF BROILER CHICKENS FED GRADED LEVELS OF PUMPKIN SEED MEAL

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ABSTRACT
The high cost of conventional feedstuff has necessitated the search for alternative feedstuff. This study was conducted to determine the performance and cost implication of broiler chickens fed graded levels of pumpkin seed meal. Pumpkin seed sourced locally was toasted, milled and tagged as pumpkin seed meal (PSM). Four treatments (T1, T2, T3, and T4) were formulated in which soybean meal (SBM) was replaced with PSM by 0%, 2.5%, 5% and 7.5%, respectively. Treatment 1 served as control. One hundred and sixty (160) day-old Hubbard broilers chicks were used. They were randomly distributed into the four treatments. Each treatment had 40 chicks divided into four replicates of 10 each. The design used was a completely randomized design. The experimental treatments and drinking water were supplied *ad libitum*. The experiment lasted for 42 days. Total feed intake and daily feed intake were not significantly ($P>0.05$) affected by treatments. Total weight gain (TWG), daily weight gain (DWG) and feed conversion ratio (FCR) were significantly ($p<0.05$) affected by treatments. Birds fed T3 had highest TWG and DWG comparable to T1 while T4 had lowest. Also, birds fed T3 had best feed conversion ratio comparable to T1 while T4 had worst. Cost of feed reduced with increased inclusion level of PSM in the diets. However, T3 had the least total cost of feed consumed while T1 had highest. Again, T3 had least feed cost/kg body weight while T4 had highest. It may be concluded that 5% PSM is recommended for economics of broiler production.
Keywords: Broiler, Cost implication, Performance, Pumpkin seed meal, Soybean meal

INTRODUCTION
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, to achieve economic of production least cost ingredients should be searched. In FAO (2012) report, the use of locally available raw materials with potentials as feed ingredients in poultry diets was emphasized. Another locally available raw material that has not been given much scientific attention is pumpkin seed. Pumpkin (*Cucurbita* spp*)* is an annual crop belonging to the family *Cucurbitaceae* (Ly and Delgado, 2009). In Nigeria it is predominantly grown in the north for its eatable fruits and leaves. The seeds are readily available and have limited food and industrial uses, thus cheap. It main anti-nutritional factor is trypsin inhibitor (Ly and Delgado, 2009). Harnessing pumpkin seed as feed resource would add value to pumpkin production. The objective of this study is; to determine the performance and cost implication of broiler chickens fed graded levels of pumpkin seed meal.

MATERIALS AND METHODS
The experiment was conducted at the poultry unit of the Teaching and Research Farm, Department of Animal Science, Faculty of Agriculture, Federal University, Gashua, Yobe State, Nigeria. The required quantity of pumpkin seed was sourced from Gashua Town and its environs. Thereafter, it was toasted using fire wood to reduce the level of trypsin inhibitor. It was milled using Lister grinder and was tagged as pumpkin seed meal (PSM). Sample of the pumpkin seed collected was analyzed to determine the proximate composition using AOAC (2006) protocol (Table 1).
Four treatments (T1, T2, T3, and T4) for starter and finisher broilers each with crude protein value of 23% and 21% respectively were formulated in which soybean meal (SBM) was replaced with PSM by 0%, 2.5%, 5% and 7.5%, respectively. Treatment 1 served as control (Tables 2 and 3).
One hundred and sixty (160) day-old Hubbard broiler chicks were purchased from ECWA Rural Development, Jos, Plateau State, Nigeria. They had an average initial weight of 49.61g. The chicks were

Table 1: Proximate composition (% DM) and some essential nutrients of pumpkin seed

Ash	Moisture	Protein	Fat	Crude fibre	Carbohydrate	*Calcium	*Phosphorus	**Lysine	**Methionine
4.31	10.04	30.56	24.00	15.09	16.00	0.24%	0. 43%	5.1 % protein	2.1 % protein

Values are mean of 3 samples
* **Source**: feed composition Table (2012); **Ly and Delgado (2009).

Table 2: Dietary composition of starter diets

Ingredients	T1	T2	T3	T4
Maize	50.62	50.62	50.62	50.62
Soya Bean Meal	27.00	26.32	25.65	24.97
Pumpkin Seed Meal	0.00	0.68	1.35	2.03
Wheat Offal	8.00	8.00	8.00	8.00
Groundnuts cake	8.50	8.50	8.50	8.50
Fish Meal	2.00	2.00	2.00	2.00
Bone Meal	2.00	2.00	2.00	2.00
Lime Stone	0.88	0.88	0.88	0.88
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25

Table 3: Dietary composition finisher diets

Ingredients	T1	T2	T3	T4
Maize	52.12	52.12	52.12	52.12
Soya Bean Meal	26.00	25.35	24.70	24.05
Pumpkin Seed Meal	0.00	0.65	1.30	1.95
Wheat Offal	8.00	8.00	8.00	8.00
Groundnuts cake	8.00	8.00	8.00	8.00
Fish Meal	2.00	2.00	2.00	2.00
Bone Meal	2.00	2.00	2.00	2.00
Lime Stone	0.88	0.88	0.88	0.88
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25

randomly allotted into four treatment groups. Each treatment group was assigned forty (40) birds and further divided into four replicates of 10 each. The design used was a completely randomized design (CRD). The birds were reared on deep litter system using wood shaving as litter material. The chicks were brooded for 2 weeks (because the prevailing environmental condition was warm) using charcoal as heat source while lanterns using dry cell batteries were used to provide light in case of electricity failure. The experimental treatments and drinking water were supplied *ad libitum.* Infectious bursal disease vaccine (IBDV) was administered at week one and repeated at week three. Newcastle disease vaccine (Lasota) was administered at week two and repeated at week four. Antibiotics, coccidiostats and anti-stress were administered as the need arise. Waste litter was removed weekly and replaced with clean litter. Mortality was recorded as it occurred. The experiment lasted for 42 days.

Feed intake was monitored by feeding weighed quantities of feed weekly and subtracting the left-over from the quantity fed the previous week. The birds were weighed weekly and weight gain calculated by difference between 2 consecutive weighing. Feed conversion ratio (FCR) was derived as the ratio of feed consumed to weight gain.

The cumulative cost of each ingredient in a dietary treatment as at the time of purchase gave the total cost per treatment. Total cost of feed consumed, total feed consumed/kg body weight and feed cost/ kg body weight were all determined

The results were statistically analyzed using one-way analysis of variance (ANOVA) using SPSS version 16.0 and significance of differences among treatments was determined using Duncan multiple range test.

Results

Generally, 5% (2 birds) mortality rate from each treatment was recorded in the first week of the experiment.

Table 4 shows the average total feed intake, daily feed intake, total weight gain, daily weight gainand feed conversion ratio of broiler chickens up to 6 week of age. Total feed intake (TFI) and daily feed intake (DFI) were not significantly ($p>0.05$) affected by treatments. Total weight gain (TWG) and daily weight gain (DWG) were significantly ($p<0.05$) affected by treatments. Total weight gain, (TWG), daily weight gain (DWG) and feed conversion ratio (FCR) were significantly ($p<0.05$) affected by treatments. Birds fed T3 had highest TWG and DWG (2044.39±45.57 and 48.68±4.11g, respectively) comparable to T1 (2042.67±54.52 and 48.64±2.73g, respectively) while T4 had lowest (1790.43±58.36 and 42.63±3.19g, respectively).Birds fed T3 also had best FCR (1.60±0.05) comparable to T1 (1.64±0.10) while T4 had worst (1.86±0.06).

Table 5 shows the cost implication of broiler chickens fed diets replacing soybean with pumpkin seed meal up to 6 weeks of age. Cost of 100 kg feed and cost of 1 kg feed reduced with increased PSM in the diets. However, T3 had least total cost of feed consumed (460.58) while T1 had highest (480.44). Again, T3 had least total feed consumed / kg body weight (1.60kg) and feed cost /kg body weight (₦225.29) while T4 had highest (1.86kg and ₦ 259.07, respectively).

Table 4: Average total feed intake, daily feed intake, total weight gain, daily weight gain (g) and feed conversion ratio of broiler chickens up to 6 weeks of age

Treatments	TFI	DFI	TWG	DWG	FCR
T1	3349.86±23.26	79.76±6.23	2042.67±54.52^{a}	48.64±2.73^{a}	1.64±0.10^{c}
T2	3338.1±25.54	79.48±8.28	1907.48±43.16^{b}	45.42±3.38^{b}	1.75±0.09^{b}
T3	3272.97±26.44	77.93±10.46	2044.39±45.57^{a}	48.68±4.11^{a}	1.60±0.05^{c}
T4	3328.42±24.17	79.25±8.15	1790.43±58.36^{c}	42.63±3.19^{c}	1.86±0.06^{a}
Level of significant	NS	NS	*	*	*

Values are (Mean ± SEM): n=38, TFI = total feed intake, DFI = daily feed intake, TWG = total weight gain, DWG = daily weight gain, FCR = feed conversion ratio.

Means in the same column with different superscripts differed significantly, but similar superscripts did not differ significantly: * significantly ($P<0.05$); NS= Non- Significant ($P>0.05$).

Discussion

The insignificant difference observed in feed intake between the control and test diets indicates that the treatments probably had similar energy contents that reflected in similar intake. Otherwise higher intake would have been expected if any of the treatment had lower energy content. This is in conformity with the report of Patha *et al*. (2015) that birds first take feed to satisfy their energy requirements. The superiority of weight gain for broilers on T3 which favourably compared to T1 indicates that 5% PSM is the optimum inclusion level for broiler chickens without adverse effect on weight gain. Also, the high feed

Table 5: Cost implication of broiler chickens fed diets replacing soybean with pumpkin seed meal

Treatment	Cost of 100kg feed (₦)	Cost of kg feed (₦)	Total feed consumed (kg)	Total cost of feed consumed (₦)	Total feed consumed /kg body weight (kg)	feed cost /kg body weight (₦)
T1	14342.10	143.42	3.35	480.44	1.64	235.20
T2	14206.10	142.06	3.34	474.21	1.75	248.61
T3	14072.10	140.72	3.27	460.58	1.60	225.29
T4	13936.10	139.36	3.33	463.85	1.86	259.07

conversion ratio for birds fed T3 favorably compared to T1 further confirms 5% PSM as the optimum inclusion level. This agrees with the assertion of Zwoliński *et al*. (2017) that raw materials with high nutrient quality can be used to substitute for soybean. This again explains that reducing soybean by 5% and replacing that weight with PSM would give quality broiler diet. The mortality rate across the treatments at the early part of the experiment perhaps could be due to slow adaptability of the birds to the environment. This agrees with the statement of Oluyemi and Roberts (2000) emphasizing environment, genetics and nutrition as major factors play in animals' survival. The drastic reduction in feed cost as PSM replaces SBM upholds the report in FAO (2012) that least cost ingredients used in poultry diet cut down cost of feed and the resultant cost of production. The least total cost of feed consumed per weight gain and least feed cost per kg body weight observed in T3 indicate that for cost effective of broiler feed production, PSM may be used at 5% level.

CONCLUSION AND RECOMMENDATION

The performance and cost implication of broiler chickens fed graded levels of pumpkin seed meal conducted in this study showed that the optimum level to used PSM in broilers diets was at 5% without adverse effect on weight gain, feed intake and feed conversion ratio. Feed cost reduces as PSM replaces SBM. Therefore, 5% PSM is recommended for broiler chickens.

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